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ABSTRACT

This course, offered in the Option Y sequence of the high school mathematics program described in the Department of Education's Mathematics Program Guide, is designed to be less theoretical and more applications oriented than Algebra IA and IB. There are ten learner objectives for this course, which is designed along with Core Algebra to fulfill college entrance requirements of one year of algebra. It provides opportunities for students to strengthen and extend their background of algebraic concepts and skills and to look for patterns and use of numbers in a variety of situations. The development of problem solving skills is also a major objective of this course. The guide provides a suggested course outline and includes an annotated bibliography of suggested texts and support materials. The bulk of the document is a teacher's commentary which provides an outline of objectives, materials needed, and teaching suggestions for each lesson. Interwoven in the commentary are masters for worksheets, quizzes, and tests, with an answer key to these materials provided at the conclusion of each chapter. (MP)

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SELECTED
ALGEBRA
TOPICS
MANUAL

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SELECTED ALGEBRA TOPICS MANUAL

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INTRODUCTION

Selected Algebra Topics is a course offered in the Option Y sequence of the high school mathematics program described in the Hawaii State Department of Education's Mathematics Program Guide. This course is an algebra option which is less theoretical than Algebra IA and Algebra IB. It is also more applications-oriented. According to the guide, this course, along with Core Algebra should "fulfill the college entrance requirement of one year of algebra and provide opportunities for students to strengthen and extend their background of algebraic concepts and skills and to look for patterns and use numbers in a variety of situations."

Learner Objectives

The Mathematics Program Guide lists ten learner objectives for the Selected Algebra Topics course. They are listed below:

- Applies the fundamental counting principle to many problem situations.
- Uses permutations to solve problems.
- Recognizes situations in everyday life where permutations are important.
- Uses combinations to solve problems.
- Investigates a variety of sequences such as arithmetic, binary, and Fibonacci.
- Is aware of infinite sequences.
- Understands the nature of a function.
- Graphs and interprets functions that are linear or curved.
- Investigates the circle, ellipse, parabola, and hyperbola.
- Investigates other curves such as the sine curve, spirals, the cycloid, the logarithm curve, etc.

Problem-Solving Goals

In addition to the learner objectives, the development of problem-solving skills is an objective of this course. Problem solving in this context refers to finding an appropriate response to a new situation or to a question which does not have an obvious answer; that is, getting the answer involves more than an act of simple memory or the application of a familiar algorithm. The problem solver must analyze the situation and determine the best strategy among a choice of many.

Problem-solving skills do not necessarily result incidentally from exposure. Rather, these strategies should be taught for maximum results. The attitude of the teacher toward problem solving is an important factor. Some teaching suggestions for problem solving are:

- To encourage discussion of problems and alternatives. This is the key to the course. Every problem can be expanded if students indicate an interest.
- To ask leading questions instead of giving answers. What would happen if...? Supppose we change...?
- To emphasize and provide the time needed for thinking about the problem. True problem solving requires time to think. If the "answer" is obvious, then there is no problem.
- To emphasize the process or strategies involved. In this course, the goal is to think through a problem. Finding a solution to the problem is just one result of this thought process. These problem-solving techniques are applicable in many areas.
- To find problem solving a fun, challenging, and rewarding experience for yourself and your students.

Teacher-directed discussion is an important aspect of this course. Discussion gives students the opportunity to develop language and communication skills. For example, vocabulary can be expanded when unfamiliar words are defined. Also, teachers and students gain insights into how a student thinks when the student describes strategies used or patterns observed in a problem.

Problem-Solving Skills

The following may be used as a teacher reference or as a basis for a class discussion. Resulting ideas can be added to this list of problem-solving skills that can be applied to the study of Selected Algebra Topics.

1. Understanding the Problem.

    --restate the problem
    --determine what is known
    --draw a figure
    --clarify the vocabulary and conditions of the problem
    --write algebraic equations

2. Devising a Plan

    --determine what information is needed
    --look for a similar problem solved before
    --look for patterns in the data
    --look at alternative strategies and/or approaches

3. Carrying out the Plan

    - --organize data into tables and graphs
    - --summarize and interpret data
    - --demonstrate or explain that each step is correct

4. Looking Back

    - --Was the plan a good one?
    - --Is the answer reasonable?
    - --Has the problem been solved? The question answered?

Problem-solving strategies are incorporated throughout this course. In many cases, specific problem-solving skills are highlighted in the margin of the teacher's commentary.

Following the introduction is a review of materials that address the Selected Algebra Topics objectives. Immediately following this review is a sample Selected Algebra Topics course together with a sample Core Algebra course based on one of the materials reviewed.

Available Materials

Brief descriptions of some of the materials available for a Selected Algebra Topics course are given below:

Jacobs, H. Mathematics: A Human Endeavor. San Francisco: W. H. Freeman and Company, 1970. $8.50 (Teacher's Guide: $5)

The basic objective of Mathematics: A Human Endeavor "is to develop an interest in mathematics in students who previously had little or none," (page xiii). All of the learner objectives for the Selected Algebra Topics course are covered. The ten chapters of the text include: The Mathematical Way of Thinking, Number Sequences, Functions and Their Graphs, Large Numbers and Logarithms, Regular Polygons, Mathematical Curves, Some Methods of Counting, The Mathematics of Chance, An Introduction to Statistics, and Some Topics in Topology. The topics are presented in a way that requires a minimal mathematical background and maturity. The exercises emphasize inductive thinking and discovery. There are a number of experiments.

In addition to the student text, a teacher's guide is available from the publisher. The guide contains many ideas for presenting the material in the classroom, a suggested time schedule, and a solution key to all of the exercises.

First-Year Algebra via Applications Project (Zalman Usiskin, director) Algebra through Applications with Probability and Statistics. Reston, VA: National Council of Teachers of Mathematics, 1979. $9.50

This two-volume paperback text was developed from an NSF-funded project. The materials were designed for average first-year algebra students. All of the objectives for a Core Algebra course are covered and most of the objectives for a Selected Algebra Topics course are covered. The content for both courses are interwoven in the text. As the Core Algebra content is covered, appropriate Selected Algebra Topics content is introduced. For example, in Chapter 4, students are introduced to four models of multiplication. One of the models is the ordered pair model, which is the fundamental counting principle.

There is a major emphasis on reading. Each lesson is followed by questions of two types: "Questions covering the reading" and "Questions testing understanding of the reading." Many lessons also have "Questions for discussion and opinion" or "Questions extending the reading."

Problem solving is emphasized. Communication skills in the classroom are also stressed.

"Notes for the Teacher" is available from Zalman Usiskin, the director for $14. It includes an overview of each chapter, a list of minimal objectives for each chapter, comments for teaching each lesson, a suggested time schedule for each chapter, and an answer key for the student's text.

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Seymour, D. and Shedd, M. Finite Differences. Palo Alto, CA: Creative Publications, Inc., 1973. ($6.50)

This booklet has students investigate a variety of sequences and other problems. The first section presents the students with a number of problems--some are easy, others are more complex. The second part of the book discusses how to solve certain mathematical problems using the finite difference technique.

It may be used to enrich and supplement a Selected Algebra Topics class.

The School Mathematics Project (SMP) Books A-H, X, Y, and Z. Cambridge, England: Cambridge University Press, 1972-1975. Books A-H: $2.95 (Teacher's Edition: $8.95); X, Y, and Z: $4.95 (Teacher's Edition: $6.95).

The eight paperback books in the Basic Mathematics Series A-H are intended for average students from grades 7 to 10. Books X, Y, and Z continue this series for college-bound students. The program was written for students who would enroll in mathematics every year in high school.

Most of the objectives for the Selected Algebra Topics course are covered, but span all eight books. It is possible to select those portions of the materials for a one-semester Selected Algebra Topics course. However, SMP would probably be more successful if taught as a sequence. The variety of topics in each book provides a change of pace for the students and holds their interest.

Problem solving is emphasized. There is also much investigation and discovery by the students.

The teacher's editions for Books A-H contain the pages from the student's books interleaved with comments and answers to questions. The comments show the purpose of new and unusual topics and fresh approaches to old topics, provide occasional notes and references on the background to the mathematics, and suggest how to teach the topics.

The teacher's editions for Books X-Z provide the answers, but do not provide the student pages. Instead, these are more suggestions on teaching the topics in each book.

A Sample Selected Algebra Topics Course

As pointed out in Part I of this module, the Algebra Through Applications text not only addresses most of the objectives for a Selected Algebra Topics course, but also addresses all of the objectives for a Core Algebra course. The contents for both courses are interwoven in the text. As the Core Algebra content is covered the appropriate Selected Algebra Topics content is introduced. The table below indicates the lessons in the text that address the objectives for the courses:

CORE ALGEBRA	SELECTED ALGEBRA TOPICS
Chapter 2, Lessons 2 - 8	Chapter 2, Lesson 8 - Exercises 5 & 6 on page 111
Chapter 3, Lessons 2 - 6	
Chapter 4, Lessons 1 & 4	Chapter 4, Lesson 2
Chapter 5, Lessons 5 & 6	Chapter 5, Lessons 2 - 3
Chapter 6, Lessons 2 - 5	Chapter 9, Lesson 2
Chapter 7, Lessons 1 - 3, 5 - 6	Chapter 10, Lesson 2
Chapter 8, Lessons 1 - 8	Chapter 14, Lesson 4
Chapter 9, Lessons 1 & 2	Chapter 15, Lesson 2
Chapter 10, Lessons 1, 3 - 6	Chapter 16, Lessons 1 - 6
Chapter 11, Lessons 1 - 5	
Chapter 12, Lessons 6 - 7	
Chapter 16, Lessons 3 - 5	

One-semester Core Algebra and Selected Algebra Topics courses could be organized based on the lessons identified for each course above. However, Algebra Through Applications would probably be more successful if taught as a sequence. Topics in Core Algebra, Selected Algebra Topics, as well as in probability and statistics, are presented in almost every chapter. The variety provides a change of pace for the students.

For the sample courses using the Algebra Through Applications text, the materials were taught as a sequence (rather than as separate one-semester courses). Because the materials lend themselves to cover the course objectives simultaneously this approach was adopted.

Course Outline and Suggested Time Schedule

The course outline and a suggested time schedule follow this introduction. The time schedule is based on 45-minute periods which meet daily. It should be adapted to individual situations.

Teacher's Commentary

The Teacher's Commentary section follows the Course Outline and Suggested Time Schedule. This section provides an outline of objectives, materials needed, and teaching suggestions for each lesson in the text. The Suggestions for Teaching includes notes about the lessons under the headings: Vocabulary, Symbols, Materials Needed, and Comments.

The "Vocabulary" lists the new terms for the lesson. The teacher should point out these new terms to the students and should help the students to pronounce the words correctly, to learn their meanings, and to use them properly. Students should be encouraged to use the new terms whenever possible.

A list of new symbols for the lesson is given under the second heading. The teacher should spend time familiarizing the students with the new symbols.

"Materials Needed" is a list of materials to be used for each lesson. These are supplies other than paper and pencil.

Comments on instructional strategies are given under the last heading. These notes point out ideas that should be emphasized in a class discussion as well as provide suggestions to encourage problem-solving behavior by the students. In many cases, problem-solving strategies are highlighted in the margins of the commentaries. However, the teacher should try to promote problem-solving behavior and skills at other times as well.

Sample quizzes and tests are provided for each unit. They follow directly after the commentary of each unit. The quizzes are usually between 5 and 15 minutes in length. The tests are about 45 minutes long. Supplementary Worksheets are also provided. Notations are given in the "Suggestions for Teaching" to indicate when these quizzes, tests, and supplementary worksheets may be best assigned.

COURSE OUTLINE AND
SUGGESTED TIME SCHEDULE FOR A
SAMPLE CORE ALGEBRA AND SELECTED ALGEBRA TOPICS COURSES

Introduction (1 day)

Make Announcements
Distribute books
Assign worksheet, "Reading the Textbook," and discuss the worksheet with the class.

Chapter 1: Some Uses of Numbers (14 days)

Day 1: Class discussion: Lesson 1
Lesson 1 - QCR, QTU, QD*

Day 2: Class discussion: Lesson 1
Class discussion: Lesson 2
Lesson 2 - QCR, QTU: #1 - 20

Day 3: Class discussion: Lesson 2
Skill Review
Lesson 3 - QCR

Day 4: Class discussion: Skill Review & Lesson 3
Lesson 3 - QTU: #2, 4, 9, 10 - 16

Day 5: QUIZ 1 (Lessons 1 - 2)
Class discussion: Lesson 3
Class discussion: Lesson 4
Lesson 4 - QCR, QTU: #1 - 12

Day 6: Class discussion: Lesson 4
Lesson 4 - QD
Newspaper Activity
Summary Questions

Day 7: QUIZ 2 (Lessons 3 - 4)
Class discussion: Summary Questions
Class discussion: Lesson 5
Lesson 5 - QCR, QTU: #1 - 5, 7, 8, QD

Day 8: Class discussion: Lesson 5
Class discussion: Lesson 6
Lesson 6 - QCR, QTU: #1 - 8

Day 9: Class discussion: Lesson 6
Lesson 6 - QTU: #12 & 13 in class, QD: #1 & 2
Class discussion: Lesson 7
Lesson 7 - QCR

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*QCR represents "Questions covering the reading"
QTU represents "Questions testing understanding of the reading"
QD represents "Questions for discussion"
QER represents "Questions extending the reading"

Day 10: QUIZ 3 (Lessons 5 - 6)
Class discussion: Lesson 7
Class discussion: Lesson 8
Lesson 7 - QTU: (even numbers), QD: #2
Lesson 8 - QCR: #2 - 6, 13 - 21

Day 11: Class discussion: Lessons 7 & 8
QUIZ 4 (Lessons 7 & 8)
Class discussion: Lesson 10
Lesson 8 - QTU: #1 - 12
Lesson 10 - QCR, QTU: #1 - 7 (odd numbers)

Day 12: Class discussion: Lessons 8 & 10
Lesson 10 - QTU: #9 - 14, QD: #4
Chapter Summary
Chapter Review

Day 13: Class discussion: Lesson 10
Review

Day 14: Chapter 1 Test
Assign: Chapter 2, Lesson 1 - QCR

Chapter 2: Patterns and Variables (15 days)

Day 1: Class discussion: Lesson 1
Lesson 1 - QER, QDO

Day 2: Class discussion: Lesson 1
Lesson 2 - QCR

Day 3: Class discussion: Lesson 2
Lesson 2 - Supplementary Worksheet 1, QTU: #1 - 6, QD

Day 4: Class discussion: Lesson 2
Class discussion: Lesson 3
Lesson 3 - QCR, QTU: #1 - 10

Day 5: Class discussion: Lesson 3
Class discussion: Lesson 4
Lesson 3 - QTU: #11 - 20
Lesson 4 - QCR: #1 - 18

Day 6: Class discussion: Lessons 3 & 4
Lesson 4 - QCR: #19 - 34, QTU: #1 - 10

Day 7: QUIZ 1
Class discussion: Lesson 4
Lesson 4 - QTU: #11 - 17, 19, 20, 23 - 28
Lesson 5: QCR

12

Day 8: Class discussion: Lessons 4 & 5
Lesson 5 - Supplementary Worksheets 2 & 3, QAR: all

Day 9: Class discussion: Lesson 5
Class discussion: Lesson 6
Lesson 6 - QCR, QTU

Day 10: QUIZ 2
Class discussion: Lesson 6
Class discussion: Lesson 7
Lesson 7 - QCR

Day 11: Class discussion: Lesson 7
Lesson 7 - QTU

Day 12: Class discussion: Lesson 7
Class discussion: Lesson 8
Lesson 8 - QCR: all, QAR: #1, 2, 4

Day 13: QUIZ 3
Class discussion: Lesson 8
Lesson 8 - QAR: #3, 5, 6, 7, 8, 10, 12
Lesson 9 - QCR (even numbers)

Day 14: Class discussion: Lessons 8 & 9
Chapter Summary
Review

Day 15: Chapter 2 Test
Assign: Chapter 3, Lesson 1 - QCR

Chapter 3: Addition and Subtraction (11 days)

Day 1: Class discussion: Lesson 1
Lesson 1 - QTU: #2 - 8 (even numbers)

Day 2: Class discussion: Lesson 1
Lesson 2 - QCR: #1 - 15, 17 - 25 (odd numbers)

Day 3: Class discussion: Lesson 2
Class discussion: Lesson 3
Lesson 2 - QTU: #1 - 17, 19, 21, 23 & 25
Lesson 3 - QCR, QTU: #1, 3, 5, 6 - 9

Day 4: QUIZ 1
Class discussion: Lessons 2 & 3
Lessons 3 - QTU: #10 - 18, QD
Lesson 4 - QCR, QTU

Day 5: Class discussion: Lessons 3 & 4
Class discussion: Lesson 5
Lesson 5 - QCR

Day 6: QUIZ 2
Class discussion: Lesson 5
Lesson 5 - QTU: #1 - 26

Day 7: Class discussion: Lesson 5
Class discussion: Lesson 6
Lesson 6 - QCR, QTU: #9 - 23

Day 8: Class discussion: Lesson 6
Class discussion: Lesson 7
Lesson 7 - QCR, QTU: #1, 4, 5, 7, 10, 11, 13, 14

Day 9: QUIZ 3
Class discussion: Lesson 7
Class discussion: Lessons 8 & 9
Lesson 8 - QCR: #1 - 18
Lesson 9 - QCR: #1 - 18, QAR: #1 - 6

Day 10: Class discussion: Lessons 8 & 9
Review

Day 11: Review
Chapter 3 Test
Assign: Chapter 4, Lesson 1 - QCR: #1 - 8, 9 - 23 (odd numbers)

Chapter 4: Multiplication (12 days)

Day 1: Class discussion: Lesson 1
Lesson 1 - QTU: #1 - 7, 9 - 17 (odd numbers), 19, 22

Day 2: Class discussion: Lesson 1
Class discussion: Lesson 2
Lesson 2 - QCR

Day 3: Class discussion: Lesson 2
Lesson 2 - QTU: #1 - 12
Skill Review (Optional)

Day 4: Class discussion: Lesson 2
Class discussion: Lesson 3
Lesson 3 - QCR: #1 - 3, 4, 5, 9 - 12, QTU: #1 - 6

Day 5: QUIZ 1
Class discussion: Lesson 3
Lesson 3 - QTU: #11 - 17, 18, 20, 22

Day 6: Class discussion: Lesson 3
Class discussion: Lesson 4
Lesson 4 - QCR

Day 7: Class discussion: Lesson 4
Class discussion: Lesson 5
Lesson 4 - QTU: #1 - 13
Lesson 5 - QCR:(even numbers)

Day 8: QUIZ 2
Class discussion: Lesson 5
Lesson 5 - QTU: #1, 4 - 10, QD

Day 9: Class discussion: Lesson 5
Class discussion: Lesson 6
Lesson 6 - QCR

Day 10: Class discussion: Lesson 6
Class discussion: Lesson 7
Lesson 6 - QTU: #1 - 6, 11 - 29
Lesson 7 - QCR

Day 11: QUIZ 3
Class discussion: Lesson 7
Lesson 7 - QTU (in class)

Day 12: Chapter Summary
Chapter 4 Test
Assign: Chapter 5, Lesson 1 - QCR

Chapter 5: Models for Division (9 days)

Day 1: Class discussion: Lesson 1
Lesson 1 - QTU, Multiplication and Division of Real Numbers Worksheets (W 5-8 and W 5-9)

Day 2: Class discussion: Lesson 1
Class discussion: Lesson 2
Lesson 2 - QCR, QTU

Day 3: Class discussion: Lesson 2
Class discussion: Lesson 3
Lesson 3 - QCR, QTU

Day 4: Class discussion: Lesson 3
Class discussion: Lesson 5
Lesson 5 - QCR

Day 5: QUIZ 1
Class discussion: Lesson 5
Lesson 5 - QTU

Day 6: Class discussion: Lesson 5
Class discussion: Lesson 6
Lesson 6 - QCR

Day 7: QUIZ 2
Class discussion: Lesson 6
Lesson 6 - QTU

Day 8: Class discussion: Lesson 6
Chapter Summary
Review

Day 9: Chapter 5 Test
Assign: Chapter 6, Lesson 1 - QCR, QTU: #1 - 5

Chapter 6: Sentence-Solving (16 days)

Day 1: Class discussion: Lesson 1 and Marking Experiment
Lesson 1 - QTU: #6, 8, 9, QD: #1 - 4, #5 - 7 (one only)

Day 2: Class discussion: Lesson 1
Class discussion: Lesson 2
Lesson 2 - QCR

Day 3: Class discussion: Lesson 2
Class discussion: Lesson 3
Lesson 2 - QAR: #1 - 4, 11 - 18
Lesson 3 - QCR: #1 - 12

Day 4: Class discussion: Lessons 2 & 3
Lesson 3 - QCR: #13 - 34

Day 5: Class discussion: Lesson 3
Lesson 3 - QAR: #1, 4 - 10

Day 6: QUIZ 1
Class discussion: Lesson 3
Class discussion: Lesson 4
Lesson 4 - QCR

Day 7: Class discussion: Lesson 4
Lesson 4 - QTU: (even numbers), QD

Day 8: Class discussion: Lesson 4
Class discussion: Lesson 5
Lesson 5 - QCR

Day 9: QUIZ 2
Class discussion: Lesson 5
Lesson 5 - QTU

Day 10: Class discussion: Lesson 5
Review

Day 11: Chapter 6 Test, Part I
Assign: Lesson 6 - QCR

Day 12: Class discussion: Lesson 6
Lesson 6 - QAR

Day 13: Class discussion: Lesson 6
Class discussion: Lesson 7
Lesson 7 - QSI: #1-22

Day 14: Class discussion: Lesson 7
Class discussion: Lesson 8
Lesson 8 - QCR

Day 15: Class discussion: Lesson 8
Chapter Summary
Review

Day 16: Chapter 6 Test, Part II
Assign: Reading of Chapter 7, Lesson 1

Chapter 7: Linear Expressions and Distributivity, Part I (14 days)

Day 1: Class discussion: Lesson 1
Lesson 1 - QCR, QER

Day 2: Class discussion: Lesson 1
Lesson 2 - Worksheet 1, QCR: #1 - 8

Day 3: Class discussion: Lesson 2
Lesson 2 - QCR: #9 - 12, QAR

Day 4: Class discussion: Lesson 2
QUIZ 1
Class discussion: Lesson 3
Lesson 3 - QCR: #1 - 20, QD: #1

Day 5: Class discussion: Lesson 3
Lesson 3 - QCR: #21 - 32, QAR: #1 - 8

Day 6: Class discussion: Lesson 3
Lesson 3 - QAR: #13 - 22

Day 7: Class discussion: Lesson 3
Class discussion: Lesson 4
Lesson 4 - Worksheet 2, QCR

Day 8: QUIZ 2
Class discussion: Lesson 4
Lesson 4 - QTU

Day 9: Class discussion: Lesson 4
Class discussion: Lesson 5
Lesson 5 - QCR: #1 - 13 (odd numbers), #14 - 31

Day 10: QUIZ 3
Class discussion: Lesson 5
Lesson 5 - QCR: #32 - 39, QTU

Day 11: Class discussion: Lesson 5
Class discussion: Lesson 6
Lesson 6 - QCR

Day 12: Class discussion: Lesson 6
Lesson 6 - QTU

Day 13: Class discussion: Lesson 6
Chapter Summary
Review

Day 14: Chapter 7 Test
Assign: Chapter 8, Lesson 1 - QCR

Chapter 8: Linear Expressions and Distributivity, Part II (19 days)

Day 1: Class discussion: Lesson 1
Lesson 1 - QTU, QD

Day 2: Class discussion: Lesson 1
Class discussion: Lesson 2
Lesson 2 - QCR

Day 3: Class discussion: Lesson 2
Lesson 2 - QAR: #1 - 8

Day 4: Class discussion: Lesson 2
Class discussion: Lesson 3
Lesson 3 - QCR

Day 5: QUIZ 1
Class discussion: Lesson 3
Lesson 3 - QTU

Day 6: Class discussion: Lesson 3
Class discussion: Lesson 4
Lesson 4 - QCR: #1 - 22

Day 7: Class discussion: Lesson 4
Lesson 4 - QCR: #23 - 40, Supplementary Worksheet 1

Oct 18

Day 8: Class discussion: Lesson 4
Lesson 4 - QTU

Day 9: Class discussion: Lesson 4
Class discussion: Lesson 5
Lesson 5 - QCR

Day 10: QUIZ 2
Class discussion: Lesson 5
Lesson 5 - QTU

Day 11: Class discussion: Lesson 5
Class discussion: Lesson 6
Lesson 6 - QCR

Day 12: Class discussion: Lesson 6
Lesson 6 - QTU

Day 13: Class discussion: Lesson 6
Class discussion: Lesson 7
Lesson 7 - QCR: #1 - 12

Day 14: Class discussion: Lesson 7
Lesson 7 - QCR: #13 - 20, Supplementary Worksheet 2

Day 15: Class discussion: Lesson 7
Lesson 7 - QTU

Day 16: Class discussion: Lesson 7
Class discussion: Lesson 8
Lesson 8 - QCR, QTU

Day 17: QUIZ 3
Class discussion: Lesson 8
Lesson 8 - Supplementary Worksheet 3

Day 18: Class discussion: Lesson 8
Chapter Summary
Review

Day 19: Chapter 8 Test
Assign: Chapter 9, Lesson 1 - QCR, 2 examples of graphs from the newspaper and/or magazine

Chapter 9: Slopes and Lines (13 days)

Day 1: Class discussion: Lesson 1
Lesson 1 - QTU

Day 2: Class discussion: Lesson 1
Class discussion: Lesson 2
Lesson 2 - QCR, QTU

Day 3: Class discussion: Lesson 2
Supplementary Worksheets 1 and 2, QE

Day 4: Class discussion: Lesson 2
Class discussion: Lesson 3
Lesson 3 - QCR, QTU

Day 5: QUIZ 1
Class discussion: Lesson 3
Class discussion: Lesson 4
Lesson 4 - QCR

Day 6: Class discussion: Lesson 4
Lesson 4 - QTU, QD

Day 7: Class discussion: Lesson 4
Class discussion: Lesson 5
Lesson 5 - QCR

Day 8: Class discussion: Lesson 5
Lesson 5 - QTU: #13 - 16, Supplementary Worksheet 3

Day 9: Class discussion: Lesson 5
Class discussion: Lesson 6
Lesson 6 - QCR: #1 - 30

Day 10: QUIZ 2
Class discussion: Lesson 6
Lesson 6 - QCR: #31 - 34, QTU: #1 - 12

Day 11: Class discussion: Lesson 6
Lesson 9 - QCR, QTU (except #5 & 6)

Day 12: Class discussion: Lesson 9
Lesson 10 - only reading
Chapter Summary
Review

Day 13: Chapter 9 Test
Assign: Chapter 10, Lesson 1 - QCR

Chapter 10: Powering (12 days)

Day 1: Class discussion: Lesson 1
Lesson 1 - QTU: #1 - 10, 11, 14, 15 - 19

Day 2: Class discussion: Lesson 1
Lesson 2 - QCR: #1 - 19

Day 3: Class discussion: Lesson 2
Lesson 2 - QCR: #20 - 25, QER: #1 - 14, QD: #1

Day 4: Class discussion: Lesson 2
Class discussion: Lesson 3
Lesson 3 - QCR: #1 - 27, QAR: #1, 2, 4 - 12 (even numbers)

Day 5: Class discussion: Lesson 3
Class discussion: Lesson 4
Lesson 4 - QCR: #1 - 21

Day 6: QUIZ 1
Class discussion: Lesson 4
Lesson 4 - QCR: #22 - 33, QE: #1, 2

Day 7: Class discussion: Lesson 4
Lesson 4 - QE: #3 - 7
Lesson 5 - QCR, QER: #1 - 5

Day 8: Class discussion: Lessons 4 & 5
Lesson 5 - QER: #16 - 42

Day 9: Class discussion: Lesson 5
Class discussion: Lesson 6
Lesson 6 - QCR

Day 10: QUIZ 2
Class discussion: Lesson 6
Lesson 6 - QTU

Day 11: Class discussion: Lesson 6
Chapter Summary
Review

Day 12: Chapter 10 Test
Assign: Chapter 11, Lesson 1 - QCR

Chapter 11: Operations with Powers (13 days)

Day 1: Class discussion: Lesson 1
Lesson 1 - QER: #5 - 9, 12 - 20

Day 2: Class discussion: Lesson 1
Class discussion: Lesson 2
Lesson 2 - QCR: #1, 3, 5, 6 - 27

Day 3: Class discussion: Lesson 2
Lesson 2 - QTU: #1 - 12, 15 - 20

Day 4: Class discussion: Lesson 2
Lesson 2 - QTU: #24 - 28, Supplementary Worksheet 1

Day 5: Class discussion: Lesson 2
Class discussion: Lesson 3
Lesson 3 - QCR: #1 - 28

Day 6: QUIZ 1
Class discussion: Lesson 3
Lesson 3 - QAR: #1 - 8, 13 - 20

Day 7: Class discussion: Lesson 3
Lesson 4 - QCR

Day 8: Class discussion: Lesson 4
Lesson 4 - QAR: #1 - 21

Day 9: Class discussion: Lesson 4
Class discussion: Lesson 5
Lesson 5 - QCR: #1 - 32

Day 10: QUIZ 2
Class discussion: Lesson 5
Lesson 5 - QTU: #1 - 6, 13 - 20

Day 11: Class discussion: Lesson 5
Lesson 5 - QTU: #7 - 12, 21 - 26, 31 - 33

Day 12: Class discussion: Lesson 5
Chapter Summary
Review

Day 13: Chapter 11 Test
Assign: Reading of Chapter 12, Lesson 6 - QCR: #1 - 5

Chapter 12: Squares and Square Roots (5 days)

Day 1: Class discussion: Lesson 6
Lesson 6 - QCR: #6 - 31

Day 2: Class discussion: Lesson 6
Class discussion: Lesson 7
Lesson 7 - QCR: #1 - 15, 36 - 40

Day 3: Class discussion: Lesson 7
Lesson 7 - QCR: #16 - 33, 41 - 44, QE: #1 - 2

Day 4: Class discussion: Lesson 7
Review

Day 5: Chapter 12 Test
Assign: Reading of Chapter 16, Lesson 1

Chapter 16: Functions (10 days)

Day 1: Class discussion: Lesson 1
Lesson 1 - QCR

Day 2: Class discussion: Lesson 1
Lesson 1 - QER, Supplementary Worksheet 1

Day 3: Class discussion: Lesson 1
Class discussion: Lesson 2
Lesson 2 - QCR, QTU: #1 - 6

Day 4: Class discussion: Lesson 2
Class discussion: Lesson 3
Lesson 3 - QCR: #1 - 20

Day 5: QUIZ 1
Class discussion: Lesson 3
Lesson 3 - QER: #1 - 15

Day 6: Class discussion: Lesson 3
Class discussion: Lesson 5
Lesson 5 - QCR: #1, 2, 3, 5, 7, 9, 10, QE: #1

Day 7: QUIZ 2
Class discussion: Lesson 5
Lesson 5 - QCR: #4, 6, 8, QTU: #1 - 6

Day 8: Class discussion: Lesson 5
Lesson 5 - QTU: #7 - 12

Day 9: Class discussion: Lesson 5
Chapter Summary
Review

Day 10: Chapter 16 Test

Chapter 1 - Some Uses of Numbers

Suggestions for Teaching

Lesson 1: Some Uses of the Natural Numbers, pp. 1 - 5

Objectives:

1) To read the textbook.
2) To recognize natural numbers.
3) To recognize the three basic uses of natural numbers: counting, identification or coding, and ordering.
4) To think about numbers and their uses.

Vocabulary: natural numbers, counting, identification, coding, ordering, measuring, comparison, locating, scoring

Comments: Read T1-1 through T1-5.*

STUDENTS SHOULD READ!

Start the lesson by having the students briefly discuss the uses of numbers. You may want to ask questions such as
--What are the uses of the numbers like, "1, 2, 3, 4, ..."?
--Where do you see numbers like, "1, 2, 3, 4, ..."?
DO NOT lecture on the uses of the natural numbers. Remember that one of the most important objectives to the lesson is to get the student to read.

Assign the reading of pages 1 through 3 and the questions that follow. Stress the importance of reading the entire lesson before trying to answer the exercises.

HINTS in reading: UNDERLINING

After students have read the lesson, discuss with them the use of underlining to:

1) signify new terms like "natural numbers" on page 1,
2) emphasize important ideas like the "First use of natural numbers: counting" on page 1.

Have students discuss their answers to the questions on pages 3 - 5. During the class discussion, you should have students give other examples of natural numbers being used for counting, ordering, and so on.

Point out to the students the three types of questions in most lessons: "Questions covering the reading," "Questions testing understanding of the reading," and "Questions for discussion and opinion." These titles are designed to let the student know that he or she is expected to read. Be sure to tell them they should refer back to the reading to answer the "Questions covering the reading," if necessary.

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* These pages refer to the "Notes for the Teacher" by Zalman Usiskin.

MORE THAN ONE ANSWER Students should also be notified that not all questions will have only one correct answer. In particular, answers will vary for the Questions for Discussion.

Suggested Assignments: QCR, QTU, QD**

Lesson 2: Rational Numbers and Measurements, pp. 6 - 13

Objectives:

1) To recognize rational numbers.
2) To represent a rational number as a ratio, a decimal, a percent, or a fraction.
3) To recognize the uses of rational numbers in measuring, scoring, and locating.

Vocabulary: rational number, ratio, decimal, percent, quotient

Comments: Read T1-6.

The terms, natural numbers, fraction, ratio, decimal, quotient, percent, and "mixed" number should already be familiar to the students. To help students remember these terms and the term, rational number, encourage them to use the terms as often as possible.

Assign "Questions covering the reading" and "Questions testing understanding of the reading." Remind the students to read the entire lesson prior to doing the exercises. Then have students discuss their results. Depending upon their performance on Exercises 13 - 20 on page 10, you may want to assign the "Skill review" on pages 10 - 13 (answers are provided) and/or the Skill Review Worksheet.

QUIZ I Anytime after Lesson 2

Suggested Assignments:

1) QCR, QTU: #1 - 20
2) "Skill review" and/or Skill Review Worksheet

Lesson 3: Number Lines and Bar Graphs, pp. 14 - 19

Objectives:

1) To read number lines and bar graphs.
2) To graph points on a number line.
3) To draw bar graphs.

** QCR represents "Questions covering the reading"
QTU represents "Questions testing understanding of the reading"
QD represents "Questions for discussion and opinion"

Vocabulary: number line, scale, bar graph, uniform scale

Materials Needed: thermometers (preferably both Celsius and Fahrenheit), metric and standard rulers

Comments: Read T1-7.

PROBLEM SOLVING: READING AND DRAWING GRAPHS

One of the purposes for this lesson is to get the students thinking about organizing data. It is very important for the students to be able to organize data into lists, tables, figures, graphs, diagrams, and so on. In this lesson, students are introduced to two forms of graphing--the number line and the bar graph.

Students should be given practice in interpreting the information presented in various number lines and bar graphs.

Be sure to discuss the importance of uniform scales in graphs (as pointed out on page 16). You may want to show examples of graphs that have nonuniform scales and discuss how misleading they are.

Time should also be spent on discussing the use of different scales (e.g., scales with units marked in multiples of 10's, 100's, and so on) on number lines and bar graphs.

The actual handling of thermometers and rulers may facilitate measurement skills as well as the understanding of scale differences.

"REAL" BAR GRAPHS

Students should be familiarized with variations of bar graphs such as those with vertical bars and percent scales.

Show some "real" examples of bar graphs from newpapers, magazines, and so on. You may want to have the students look for examples too.

Suggested Assignments:
1) QCR
2) QTU: #2, 4, 9, 10 - 16

Lesson 4: Rational Numbers and Comparison, pp. 19 - 25

Objectives:
1) To recognize and apply the use of numbers in comparisons (including ratios and rates).
2) To estimate the percentage of the circle which is shaded.
3) To draw circle graphs.

Vocabulary: circle graph, rate

Comments: Read T1-8 and T1-9.

ESTIMATE: "SHARPEN THE EYEBALLS!"

Read through the lesson with the students. Discuss the examples with them. Students should be reminded to follow the directions on page 21 in making circle graphs. In Step 4, have students estimate divisions of the circle representing the percentages.

Another name for "circle graph" is "pie graph." You may want to also use this phrase as it emphasizes the division of the circle into pie-like pieces.

Have students explain step by step to the rest of the class how they drew the circle graphs for Exercises 9 and 10 on page 24.

CALCULATORS

It is recommended that calculators be used for Exercises 14 and 15 on page 24. If calculators are not available, you may want to at least have the students discuss how to do the exercises.

"REAL" EXAMPLES

Have students look for examples of circle graphs in the newspapers, magazines, and so on.

Suggested Assignments:
1) QCR, QTU: #1 - 12, (14, 15 - optional)
2) QD: all

Summary Questions and Newspaper Activity, pp. 25-27

Objectives:
1) To review the uses of numbers.
2) To realize the frequent usage of numbers on every page of a newspaper.

Materials Needed: newspaper

Comments: Read T1-1 about the newspaper activity. Have students estimate how many numbers are on their newspaper page using methods other than pure guessing.

ESTIMATE

You may want to have students work in pairs for this activity. Spend no more than twenty minutes to assign and discuss it. Then assign the Summary Questions on pages 25 - 26.

QUIZ 2

Anytime after Lesson 4

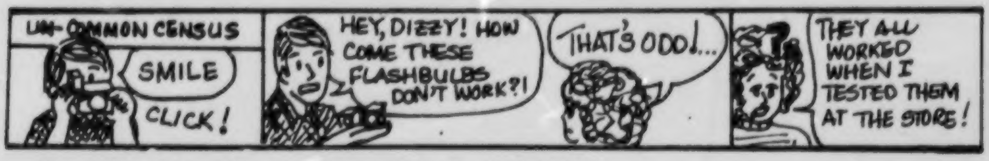
Lesson 5: TV Ratings and Sampling, pp. 28-34

Objectives:
1) To become aware of the necessity of sampling in certain situations.
2) To become familiar with the five steps in sampling procedures.
3) To be exposed to an application of statistics and to gain a basis for probability which follows in the next lesson.

Vocabulary: population, sample, subset, poll

Comments: Read T1-11.

The need for sampling is described below:


UN-COMMON CENSUS
SMILE
CLICK!
HEY, DIZZY! HOW COME THESE FLASHBULBS DON'T WORK?!
THAT'S ODD!...
THEY ALL WORKED WHEN I TESTED THEM AT THE STORE!

Example from Statistics with Probability, Intermediate School Mathematics Program, CRDG, University of Hawaii.

A number of examples on sampling and population should be reviewed as a class.

While a calculator is recommended for Exercises 5 and 6 on page 33, students should not have too much difficulty doing the problems if one is not available.

Suggested Assignments: QCR, QTU: #1 - 5, 7, 8, QD

Lesson 6: Relative Frequencies: Another Use of Ratios, pp. 34-40

Objectives:
1) To calculate a relative frequency from given data.
2) To apply the following basic properties of relative frequency:
   a) an event which always occurs has relative frequency 1
   b) an event which never occurs has relative frequency 0
   c) the more relatively often an event occurs, the higher its relative frequency.

Vocabulary: experiment, outcomes, relative frequency, probability, die (dice)

Materials Needed: dice

Comments: Read T1-13 and T1-14.

HINTS ON READING Point out to the students the use of "boxes" to emphasize an important idea (e.g., the "box" used on page 35 for the definition of relative frequency).

PROBLEM SOLVING:

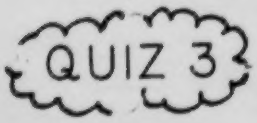
UNDERSTAND

Tables are frequently used to organize and display data. It is very important for the students to understand how the table is organized, what each number, row, and column represents. Before any analysis or interpretation can take place, the students must be able to read the table and understand what is read. You may want to call on students to explain the tables on pages 35 and 36.

Have students work in pairs to do Exercises 12 and 13 on page 39. Then have them post their outcomes on the blackboard. A discussion should follow.

Suggested Assignments:

1) QCR, QTU: #1 - 8
2) QTU: #12 & 13 in class, QD: #1 - 2



Anytime after Lesson 6

Lesson 7: Negative Numbers: Numbers to Indicate Direction, pp. 41 - 46

Objectives:

1) To compare two real numbers.
2) To graph a given real number on a number line.
3) Given a situation with two directions, to distinguish the directions, and to assign positive and negative numbers when appropriate.

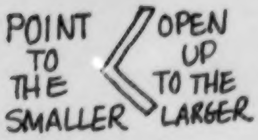
Vocabulary: opposite of, negative numbers

Symbols: - , < , > , ≤ , ≥

Comments: Read T1-15.

COMMUNICATION: Read Aloud and Write Numbers

It is important that students be able to read and write numbers correctly. Students should practice reading numbers aloud throughout the course.



For Exercises 15 - 33 on pages 44 and 45, be sure to have students explain the reasons for their answers. Students should see that given any two real numbers, the one that is to the right on a horizontal number line is greater, and the number to the left on the number line is less. Remembering that the symbols < and > open up to the larger number and point to the smaller can also be used as a mnemonic device. Examples should also be shown of correct and incorrect combinations of < and > (e.g., 2 < 3 < 4 vs. 2 < 3 > 4 or 2 < 4 > 3).

Suggested Assignments:

1) QCR
2) QTU: even numbers, QD: #2

Lesson 8: The Decimal System , pp. 47-51

Objectives:
1) To compare and distinguish repeating decimals written with bar notation.
2) To become aware of the historical background of the decimal system.
3) To recognize rational numbers as having decimal representations which either end or repeat.

Vocabulary: decimal, base 10 system, Arabic numerals, infinite decimals, binary system

Symbols: ·(raised dot), —

Comments: Read T1-16.

The binary system may have to be briefly explained to the class.

Suggested Assignments:
1) QCR: #2 - 6, 13 - 21
2) QTU: #1- 12

QUIZ 4 Anytime after Lesson 8

Lesson 9: The Metric System, pp. 52-58

Comments: While it is recommended that this lesson be omitted, you may want to briefly discuss the metric system. In particular, students may be interested in knowing that in 1790 Thomas Jefferson proposed to Congress a measuring system based on 10. At about the same time (1795), the metric system was established in France. The U.S. did not adopt Jefferson's proposal or the metric system. Instead, the English system was adopted.

HISTORY OF THE METRIC SYSTEM

Lesson 10: The Real Numbers and Measurement, pp. 58-64

Objective: To become aware of the relationship among real numbers, rational numbers, irrational numbers, and integers.

Vocabulary: integers, rational numbers, real numbers, irrational numbers, pi (π)

Comments: Read T1-18.

ORAL DRILLS

The different kinds of numbers and their relationships are discussed in this lesson. Help students to learn them by having oral drills in which students give examples of the numbers.

Suggested
  Assignments: 1) QCR: all, QTU: #1 - 7 (odd numbers)
  2) QTU: #9 - 14, QD: #4 only

Chapter Summary

Comments: Have students read and then discuss the summary.

Chapter 1 Test

Chapter 1
Skill Review Worksheet

Name ______________________

Date ______________________

1. Write each ratio as a fraction.

______ a. 4:5
______ b. 9:12
______ c. 435:600
______ d. 2.4:1
______ e. 100:100
______ f. 30:4

2. Write each decimal as a fraction.

______ a. 0.8
______ b. 6.23
______ c. 1.9
______ d. 173
______ e. 45.62
______ f. 3.1

3. Write each % as a fraction.

______ a. 9%
______ b. 20%
______ c. 0.4%
______ d. 2%
______ e. 180%
______ f. 3.5%

4. Choose the one number which is not equal to the other two.

______ a. $\frac{1}{4}$, $\frac{4}{8}$, $\frac{5}{10}$
______ b. 3.5, 35%, 0.35
______ c. 62%, 6.2, $6\frac{1}{5}$
______ d. 3, $\frac{1}{3}$, 300%
______ e. 5%, $\frac{50}{100}$, $\frac{5}{100}$
______ f. 3%, 0.3, 0.03

5. Approximate each fraction by a two-place decimal.

______ a. $\frac{5}{4}$
______ b. $\frac{16}{100}$
______ c. $\frac{3}{7}$
______ d. $\frac{9}{20}$
______ e. $\frac{17}{30}$
______ f. $\frac{4}{19}$

6. Convert to %.

______ a. $\frac{3}{10}$
______ b. $\frac{1}{6}$
______ c. $\frac{12}{100}$
______ d. $\frac{11}{20}$
______ e. $8\frac{7}{10}$
______ f. $\frac{4}{5}$

Chapter 1 Name______________________

Quiz 1 (Lessons 1 - 2) Date______________________

1. Each sentence shows a use of a number. Tell whether the number is for counting, measuring, identification, ordering, scoring, or locating.

_________ a. I am 5'6" tall.

_________ b. The U.S.A. is the 4th largest country in the world in population.

_________ c. Jan hopes to get a 95 on the test.

_________ d. His social security number is 123-45-6789.

2. Give an example of a rational number used in scoring.

3. Give an example of a natural number used in counting.

4. Is 2.5 a natural number? Is it a rational number? Explain your answer.

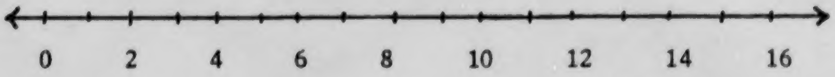
5. Complete each row of the table by writing the given number in all of the ways not given.

	fraction	ratio	decimal	percentage	quotient
a.	$\frac{2}{5}$				
b.			0.5		
c.				33 %	

Chapter 1 Name____________________

Quiz 2 (Lessons 3 - 4) Date____________________

1. Graph each number on the given number line. Label, using the letter of the question, on the number line.



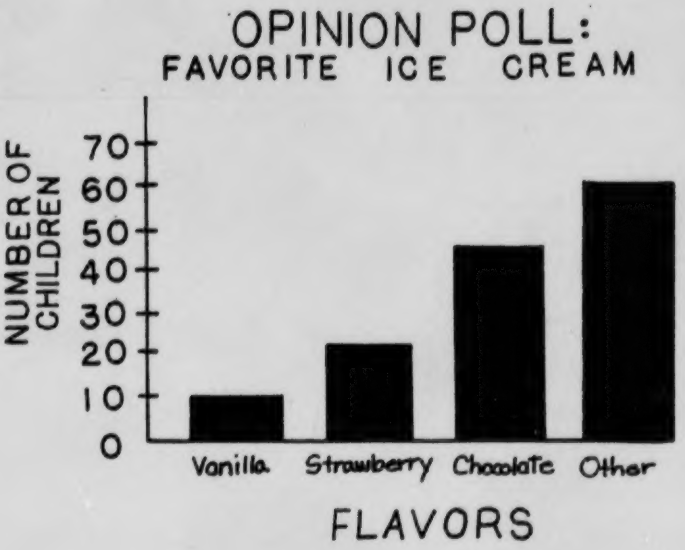
a. $\frac{12}{4}$ b. 4.98 c. $11\frac{1}{2}$

2. Use the bar graph to answer the following questions:

__________ a. About how many children preferred chocolate ice cream?

__________ b. Which kind of ice cream was least preferred by the children surveyed?

__________ c. About how many children were polled?



3. Show the given information on a single circle graph.

HOW I SPENT $100	
DINNER	45
SHOW	20
SHIRT	25
MISCELLANEOUS	10

Chapter 1 Name ______________________

Quiz 3 (Lessons 5 - 6) Date ______________________

1. Suppose someone wanted to determine the average lifespan of a person living in Hawaii. Why would sampling be necessary?

2. Give a possible population and sample for each situation.

   a. You want to know what percentage of high school students own cars.

   b. Scientists want to determine whether a certain chemical causes cancer.

3. Fifty students were asked a multiple-choice question with 5 choices: 1, 2, 3, 4, 5. Here is how they answered:

CHOICE	NUMBER OF STUDENTS SELECTING THE CHOICE
1	0
2	4
3	14
4	23
5	9

______________ a. The relative frequency of choice 3 is ? .

______________ b. The relative frequency of choice 5 is ? .

______________ c. If an event always occurs in an experiment, its relative frequency is ? .

______________ d. If an event never occurs in an experiment, its relative frequency is ? .

______________ e. In a survey, 40 of 200 people watched Channel 2, and 30 of 100 people watched Channel 7. Which Channel had the higher relative frequency of people watching?

Chapter 1 Name ____________________

Quiz 4 (Lessons 7 - 8) Date ____________________

1. Place the symbol < , = , or > between the numbers.

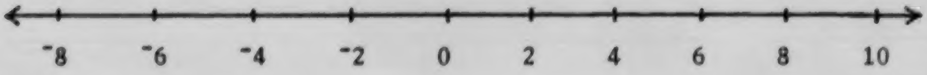
   a. $^{-}10$ ___ $^{-}9$

   b. $-\frac{1}{2}$ ___ $-\frac{1}{3}$

   c. 150.08 ___ 150.1

   d. 11.2 ___ $-(\,^{-}11.2\,)$

2. Graph each number on the given number line. (Label by the letter of the question.)



   a. .6

   b. $^{-}4.75$

   c. $6.\overline{99}$

3. What numbers could be used to represent each situation?

   a. Going backward 3 steps __________

   b. Going forward 2 steps __________

   c. Standing still __________

Chapter 1 Test

Name ______________________

Date ______________________

1. Name the use of each number in the sentence. (The different uses of the numbers are listed on the right.)

Uses of Numbers

counting
measuring
identification
comparison
ordering
scoring

_____________ a. She sits in the 4th seat.

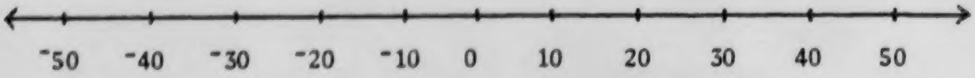
_____________ b. I weigh 62 kilograms.

_____________ c. Over $\frac{1}{7}$ of the land area of the U.S.A. is in Alaska.

_____________ d. Last weekend there were 36 animals in the veterinary hospital.

_____________ e. Call extension 58 to get the mathematics department.

2. Graph each number on the given number line. (Label each point by the letter of the question.)



a. 10   b. $^{-}35$ c. $\frac{^{-}90}{8}$ d. $32\frac{1}{2}$

3. a. What are natural numbers? Give an example.

b. Name a number that is not a natural number.

4. Give an example of a rational number used in measuring.

5. Express each number as an ending or repeating decimal.

_____________ a. $\frac{3}{5}$

_____________ b. $^{-}5\frac{2}{3}$

(Go on to the next page.)

6. Sixteen phone calls are made, with the following results:

Result	Number of Occurrences
No answer	7
Male answers	3
Female answers	6

__________ a. What was the relative frequency that a male answered the call?

__________ b. What was the relative frequency that someone answered the call?

__________ c. In an experiment, the largest possible relative frequency of an event is _?_.

__________ d. The smallest possible relative frequency is _?_.

__________ e. In School A, 250 of 400 freshmen take Algebra. In School B, 250 of 300 freshmen take Algebra. In which school is there a higher relative frequency of a freshman taking Algebra?

7. Place the symbols < , > , or = between each pair of numbers to make a true sentence.

a. $^-12$ ___ $^-14$

b. $^-8$ ___ $^-6$

c. $8.\overline{3}$ ___ $8.\overline{33}$

d. 0 ___ $^-2$

e. $^-3.\overline{03}$ ___ $^-3.03$

f. $6.\overline{46}$ ___ $4.\overline{64}$

8. Draw a bar graph showing the given information. Use a uniform scale.

THE NUMBER OF PIZZAS SOLD IN ONE WEEKEND AT THE PIZZA SHOP	
Friday	150
Saturday	200
Sunday	165

9. Tell whether each number is rational or irrational.

__________ a. $^-7.\overline{649}$

__________ b. 3.1415926

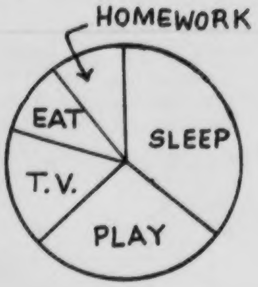
(Go on to the next page.)

10. Use the circle graph to answer the following questions.

__________ a. How will most of the weekend be spent?

__________ b. Estimate the percentage of time during the weekend spent on homework.

__________ c. Estimate the percentage of time during the weekend not spent on homework.



WEEKEND SCHEDULE

11. Write the fraction $\frac{1}{3}$ as a:

__________ a. ratio

__________ b. decimal

__________ c. percentage

12. Give an example of a situation in which sampling would be necessary.

ANSWER KEY

Chapter 1, Skill Review Worksheet

1. a. $\frac{4}{5}$ b. $\frac{9}{12}$ or $\frac{3}{4}$ c. $\frac{435}{600}$ or $\frac{87}{120}$ d. $\frac{2.4}{1}$ or $\frac{24}{10}$ or $\frac{12}{5}$
e. $\frac{100}{100}$ or $\frac{1}{1}$ f. $\frac{30}{4}$ or $\frac{15}{2}$

2. a. $\frac{8}{10}$ or $\frac{4}{5}$ b. $\frac{623}{100}$ c. $\frac{19}{10}$ d. $\frac{173}{1}$ e. $\frac{4562}{100}$ or $\frac{2281}{50}$
f. $\frac{31}{10}$

3. a. $\frac{9}{100}$ b. $\frac{20}{100}$ or $\frac{1}{5}$ c. $\frac{0.4}{100}$ or $\frac{4}{1000}$ d. $\frac{2}{100}$ or $\frac{1}{50}$
e. $\frac{180}{100}$ or $\frac{9}{5}$ f. $\frac{3.5}{100}$ or $\frac{35}{1000}$ or $\frac{7}{200}$

4. a. $\frac{1}{4}$ b. 3.5 c. 62% d. $\frac{1}{3}$ e. $\frac{50}{100}$ f. 0.3

5. a. 1.25 b. 0.16 c. 0.43 d. 0.45 e. 0.57 f. 0.21

6. a. 30% b. 16.7% c. 12% d. 55% e. 870% f. 80%

Chapter 1, Quiz 1 *(10 points)*

(4) 1. a. measuring b. ordering c. scoring d. identification

(1) 2. Answers will vary. Here is one example:
Natalie had an average score of 9.5 in the gymnastics competition.

(1) 3. Answers will vary. Here is one example:
3,640 people attended the convention in April.

(1) 4. No, 2.5 is not a natural number. Yes, it is a rational number. The number can be written as a fraction with natural numbers in its numerator and denominator. For example, 2.5 can be written as 25/10 or 5/2, and so on.

(3) 5.

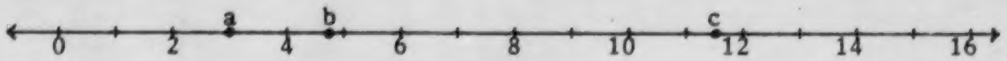
	fraction	ratio	decimal	percentage	quotient
a.	$\frac{2}{5}$	2:5	0.4	40%	2 ÷ 5
b.	$\frac{5}{10}$ or $\frac{1}{2}$	5:10	0.5	50%	5 ÷ 10
c.	$\frac{33}{100}$	33:100	0.33	33%	33 ÷ 100

(Go on to the next page.)

Chapter 1 Answer Key - Page 2

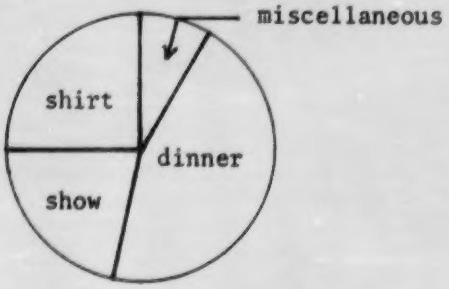
Chapter 1, Quiz 2 *(10 points)*

(3) 1.



(3) 2. a. about 45 children b. vanilla c. about 135 children

(4) 3. HOW I SPENT $100



Chapter 1, Quiz 3 *(10 points)*

(1) 1. It would be too hard to determine the lifespan of all the people living in Hawaii.

(4) 2. Answers will vary. Here are some possible answers:

a. population: The set of all high school students.
sample: Set of all high school students polled.

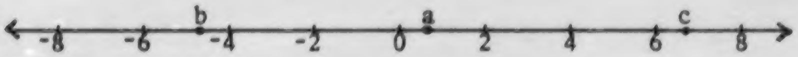
b. population: The set of all mice (or other experimental animals).
sample 1: Set of all mice exposed to the chemical.
sample 2: Set of all mice not exposed to the chemical.

(5) 3. a. $\frac{14}{50}$ or 0.28 b. $\frac{9}{50}$ or 0.18 c. 1 d. 0 e. Channel 7

Chapter 1, Quiz 4 *(10 points)*

(4) 1. a. < b. < c. < d. =

(3) 2.



(3) 3. a. $^{-}3$ b. 2 c. 0

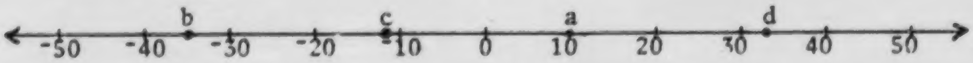
Chapter 1 Test *(50 points)*

(5) 1. a. ordering b. measuring c. comparison d. counting

e. identification

(Go on to the next page.)

Chapter 1 Answer Key - Page 3

(4) 2. 

(2) 3. a. The numbers one, two, three,...one million, one million and one,...
Answers will vary; any of the above will do.

b. Answers will vary. Here are some examples: $\frac{-1}{2}$, 6%, 8.2

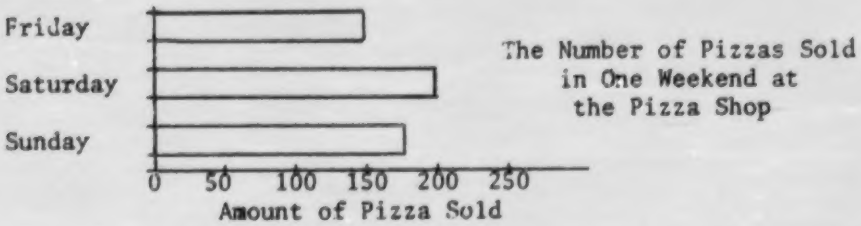
(2) 4. Answers will vary. Here as an example:
The piece of material is 2.5 yards long.

(4) 5. a. 0.6 b. $^{-}5.\overline{6}$

(10) 6. a. $\frac{3}{16}$ b. $\frac{9}{16}$ c. 1 d. 0 d. School B

(6) 7. a. > b. < c. = d. > e. < f. >

(1) 8.



The Number of Pizzas Sold
in One Weekend at
the Pizza Shop

(2) 9. a. rational b. rational

(6) 10. a. sleeping b. about 10% c. about 90%

(3) 11. a. 1 to 3 b. 0.3 c. about 33%

(2) 12. Answers will vary. Here is an example:
To predict results of a class election.

Chapter 2 - Patterns and Variables

Lesson 1: Mathematics - The Study of Patterns, pp. 67 - 72

Objectives:
1) To become aware that scientists try to find patterns in the real world and that mathematicians study these patterns.
2) To find patterns and describe them.

Vocabulary: pattern, arithmetic pattern, geometric pattern

Comments: Read T2-1 through T2-4.

PROBLEM SOLVING: FINDING & VERIFYING PATTERNS

An important problem-solving skill is to be able to find patterns in a set of data. Be sure to have students discuss how they found the patterns for QER 1 - 10 on pages 70 - 72. Describing patterns is also a skill that needs to be developed and encouraged! Verifying patterns is another skill that needs this emphasis.

Students may want to do some research for the "Questions for Discussion and Opinion." Have students present their findings to the rest of the class.

Suggested Assignments:
1) QCR
2) QER, QDO

Lesson 2: Words and Symbols of Arithmetic, pp. 73 - 79

Objectives:
1) To apply the order of operations to simplify numerical expressions involving addition, subtraction, multiplication, division, and/or parentheses.
2) To gain a historical perspective on word and symbol invention in arithmetic.
3) To translate mathematical terms and phrases into symbols and vice versa.

Vocabulary: rounding to the nearest integer, sum, product, difference, quotient

Symbols: · , —— (fraction bar)

Materials Needed: Supplementary Worksheet 1

Comments: Read T2-5.

Students should be given practice in translating mathematical terms and phrases into symbols and vice versa (e.g., "The product of 4 and the difference of 5 and 3" translated to $4 \cdot (5 - 3)$). A supplementary worksheet is provided. Teachers should be a model as well. Encourage students to use terms like "sum," "product," etc.

To help students learn the rules for order of operations, have them show and explain the steps they used to simplify expressions like those in QCR 16 - 30 on page 77.

HISTORY Students may want to do some research on the history of the symbols used for operations in arithmetic.

Suggested Assignments:
1) QCR
2) Supplementary Worksheet 1, QTU: #1 - 6, QD

Lesson 3: Describing Patterns Using Variables, pp. 79 - 83

Objective: To describe a pattern using variables given instances of the pattern.

Vocabulary: variable

Comments: Read T2-6.

COMMUNICATION: Using the Language of Mathematics For QTU's 7 - 18, students are asked to describe the possible general patterns using variables. Have students orally describe the patterns in words too. This oral activity would provide the students with more practice in using the language of mathematics and stress that the descriptions using variables are much shorter.

Be sure to stress that any letter may be used as a variable. Sometimes students mistakenly think that x is the only variable since it is used most often.

Suggested Assignments:
1) QCR, QTU: #1 - 10
2) QTU: #11 - 20

QUIZ 1 Anytime after Lesson 3

Lesson 4: Words and Symbols of Algebra, pp. 84 - 88

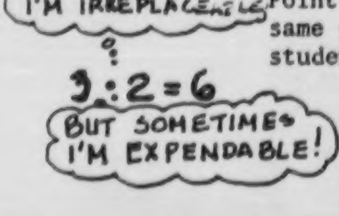
Objective: To accurately substitute into expressions which contain variables.

Vocabulary: value, evaluate

Symbols: 6y, 4(x + 3)

Comments: Read T2-7.

Point out to the students that while 6y or y6 represent the same expression, by convention, we write it as 6y. Caution students that 32 is NOT 3 · 2!



READ ALOUD Have students read the expressions aloud in QCR's 13 - 28 on pages 86 - 87 before giving their values.

Suggested Assignments:
1) QCR: #1 - 18
2) QCR: #19 - 34; QTU: #1 - 10
3) QTU: #11 - 17, 19, 20, 23 - 28

Lesson 5: Variables in Formulas, pp. 89 - 94

Objectives:
1) To accurately substitute into and calculate one side of a formula.
2) To write formulas given their description in words.

Vocabulary: formula

Materials Needed: Supplementary Worksheets 2 & 3

Comments: Read T2-8.

FINDING FORMULAS

Begin the lesson by having the students discuss what it means to find the perimeter of a figure and the different units used to measure perimeter. Then have them do Supplementary Worksheet 2. Allow time for students to do the worksheet, then come together as a class for a discussion. Ask questions such as "Can you think of another way of find the perimeter of an equilateral triangle besides adding up the measures of the three sides?" or "Is there an easier way to find the perimeter of a square?" to lead into a discussion on the formulas for the perimeters of an equilateral triangle, a square, and a rectangle.

Next, have students discuss what it means to find the area of a figure. Have them discuss the units used for measuring length. Then assign Supplementary Worksheet 3. After the students have had some time to work on the problems, have them discuss how they obtained their answers. Ask questions which would lead into a discussion on the formulas for the area of a square, a rectangle, and a triangle.

A formula that might interest students is: $w = 5.5h - 220$, where w represents the "normal" weight of a man in pounds and h represents his height in inches. Students can calculate their "normal" weights and those of their classmates. (Example taken from Elementary Algebra by Harold Jacobs.)

Suggested Assignments:
1) QCR: all
2) Supplementary Worksheets 2 & 3, QAR: all

QUIZ 2 Anytime after Lesson 5

Lesson 6: Replacement Sets for Variables, pp. 94 - 98

Objectives: To identify the replacement set for a variable and determine the possible values of an expression given that replacement set.

Vocabulary: replacement set

Comments: Read T2-8 and T2-9.

You may want to go over the difference between a replacement set of a variable and a solution to a sentence. It is especially important for students to discuss the reasons for their answers to the questions in this lesson.

Suggested Assignments: QCR, QTU

Lesson 7: Open Sentences and Solutions, pp. 98 - 103

Objectives:
1) To determine whether or not a given number is a solution to an inequality.
2) To graph the solution to an inequality.
3) To guess solutions to open sentences.

Vocabulary: open sentence, solution

Comments: Read T2-10.

Be sure to stress the differences between solutions for examples 3 and 4 on page 100. The convention of having the symbols $>$ and $<$ always pointing to the smaller number and opening to the larger should be emphasized and additional drill provided. Students should be aware of equivalent sentences such as $y > 5$ and $5 < y$ as compared to nonequivalent ones such as $y > 5$ and $y \geq 5$ or $5 > y$. The similarities, equivalence, or difference on the graphs of their solution should also be noted.

Suggested Assignments:
1) QCR: all
2) QTU: all

Lesson 8: Ordered Pairs, pp. 104 - 112

Objective: To plot points given their rectangular coordinates and the scale on each axes.

Vocabulary: ordered pair, horizontal, x-axis, vertical, y-axis, x-coordinate, rectangular coordinates, origin

Comments: Read T2-11.

Encourage students to use the new terms whenever possible. A master for the answers to the first suggested assignment (QAR Exercises #1, 2, 4) is provided. Distribute the answers to the students or show them on the overhead projector, then make the second assignment.

Suggest that students place their answers to Exercise 5 on the same graph as Exercise 4 by using different colored pencils to mark the points on the graph.

QUIZ 3 Anytime after first assignment for Lesson 8

Suggested Assignments:
1) QCR: all, QAR: #1, 2, 4
2) QAR: #3, 5, 6, 7, 8, 10, 12

Lesson 9: Subscripts, pp. 112 - 115

Objectives:
1) To identify the uses for subscripts.
2) To read subscripts.
3) To accurately substitute and calculate in expressions with variables that contain subscripts.

Vocabulary: subscripts

Comments: Read T2-13.

Have students read the lesson and answer only the questions in "Questions Covering the Reading."

Suggested Assignments: QCR: even numbers

Chapter Summary

Comments: Have students read and discuss the summary.

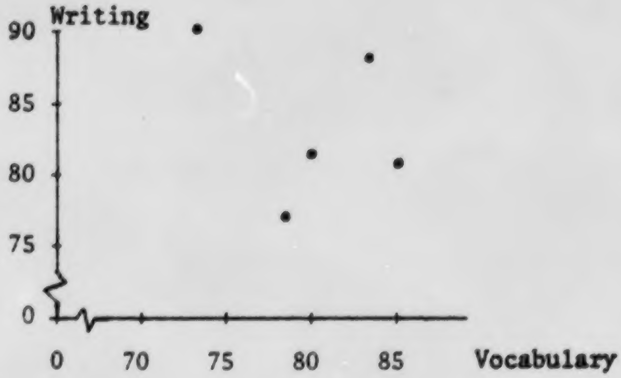
Chapter 2 Test

Chapter 2, Lesson 8

Answers for QAR #1, 2, 4

1. Comparing Students

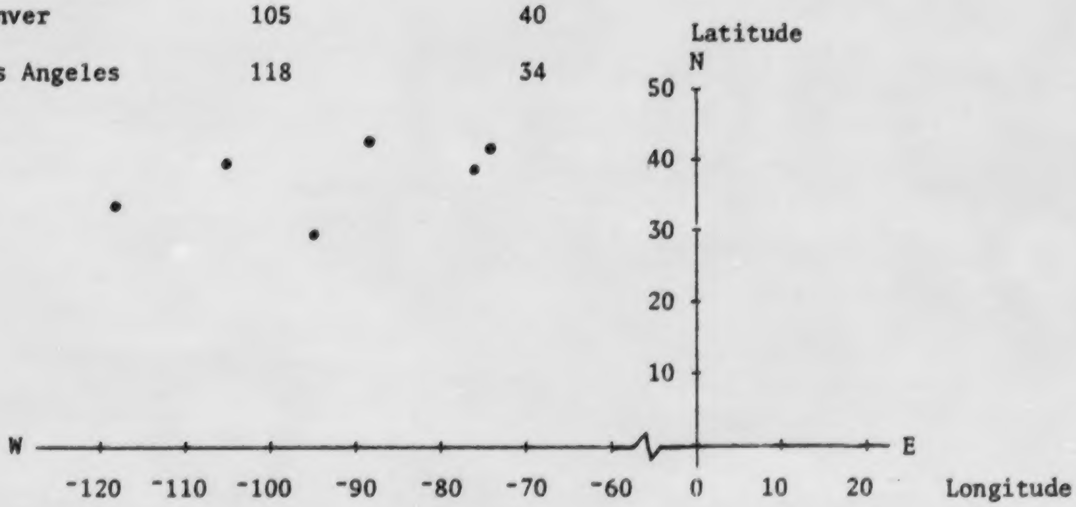
	Vocabulary	Writing
Pam	85	81
Quincy	78	77
Raoul	80	82
Sara	83	88
Thea	73	90



The (73,90) is the most different from the others, though Quincy and Sara are very much different too.

2. Locations on Earth

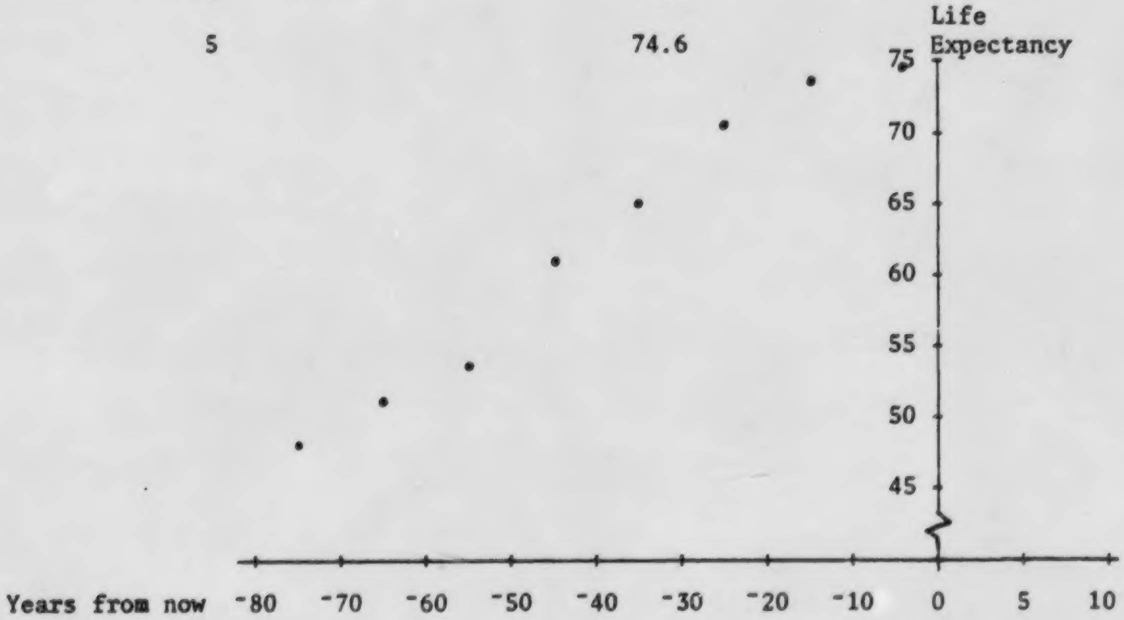
	W. Longitude	N. Latitude
New York	74	41
Washington, D.C.	77	39
Chicago	88	42
Houston	95	30
Denver	105	40
Los Angeles	118	34



Chapter 2, Lesson 8
Answers for QAR #1, 2, 4 - Page 2

4. Life Expectancy

No. of years ago (from 1975)	U.S. Female Life Expectancy
75	48.3
65	51.8
55	54.6
45	61.6
35	65.2
25	71.1
15	73.1
5	74.6



Chapter 2, Lesson 2
Supplementary Worksheet 1

Name ____________________

Date ____________________

Putting Things into Words

1. The sum of 15 and 3 is

   (a) $15 - 3$ (b) $15 \cdot 3$ (c) $15 + 3$ (d) $\frac{15}{3}$

2. 6 divided by 8 is

   (a) $8 \cdot 6$ (b) $\frac{8}{6}$ (c) $\frac{6}{8}$ (d) $8 \div 6$

3. Eight less than the product of 3 and 7 is

   (a) $8 - (3 \cdot 7)$ (c) $(8 - 3) \cdot 7$

   (b) $(3 \cdot 7) - 8$ (d) $(3 - 8) \cdot 7$

4. Choose the phrase which most accurately describes the following: $3(4 + 5)$

   (a) the product of the sum of 3, 4, and 5

   (b) the product of 3 and the sum of 4 and 5

   (c) the sum of 3 and the product of 4 and 5

   (d) the sum of the product of 3, 4, and 5

Use algebraic symbols to represent each word expression below.

5. Twice the sum of 4 and 9 ____________________

6. 9.8 from 20 ____________________

7. The product of 6 and $\frac{3}{7}$ ____________________

Write the following in words.

8. $6.5 + 8.9$ ____________________

9. $6 \div 3 + 7$ ____________________

10. $\frac{3 - 2}{8}$ ____________________

Name____________________________

Chapter 2, Lesson 5
Supplementary Worksheet 2

Date____________________________

The distance around a figure is called its perimeter. Find the perimeter of the figures below.

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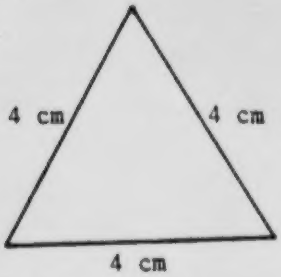

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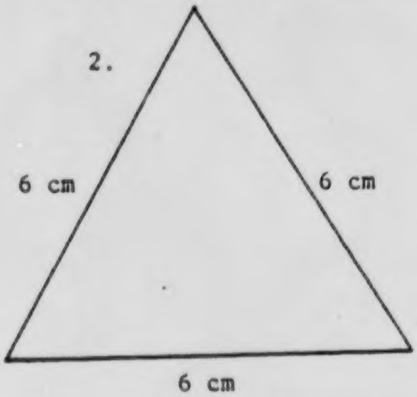

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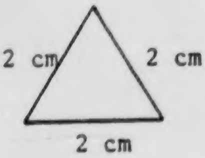

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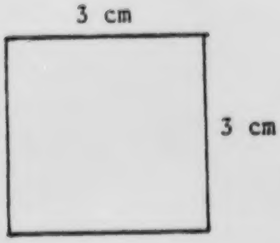

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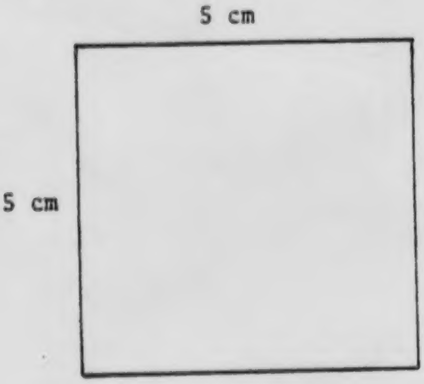

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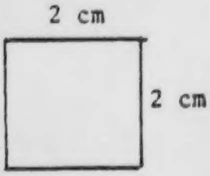

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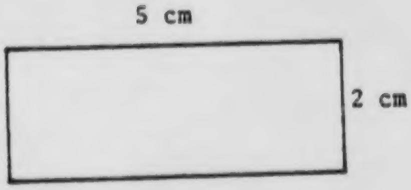

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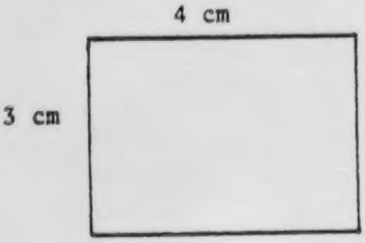

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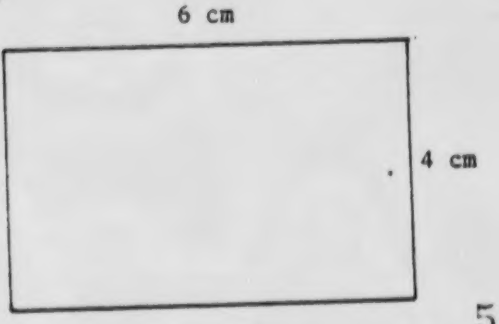

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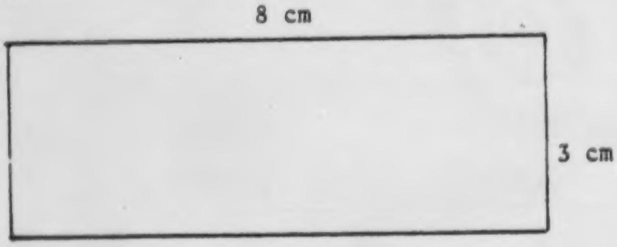


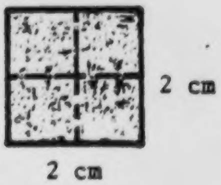
Chapter 2, Lesson 5
Supplementary Worksheet 3

Name______________________________

Date______________________________

Find the area of the shaded regions below.

1.



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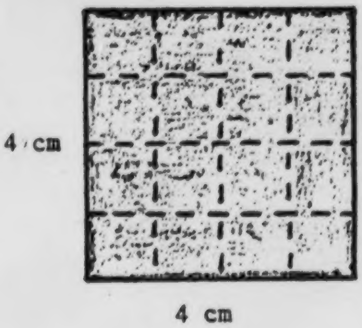

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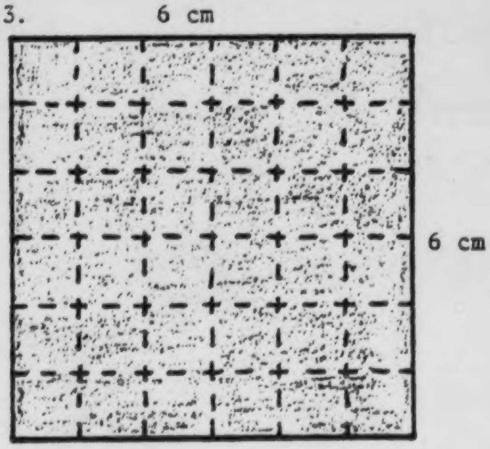

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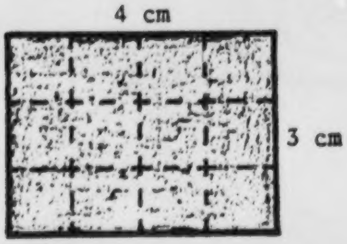

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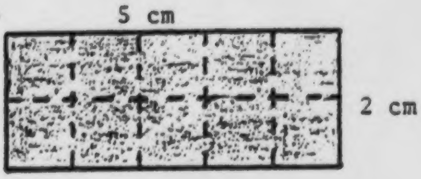

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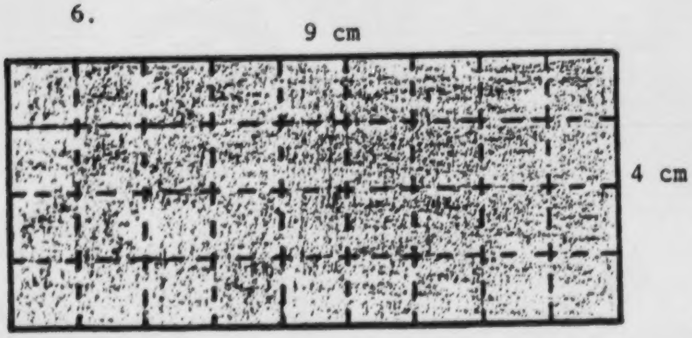

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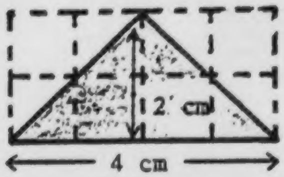

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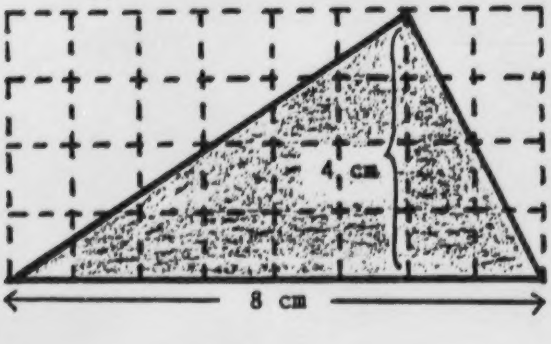

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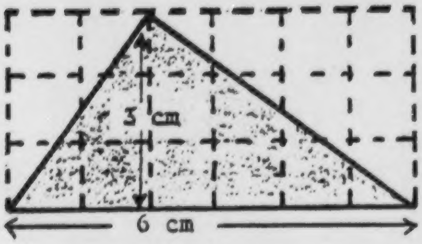

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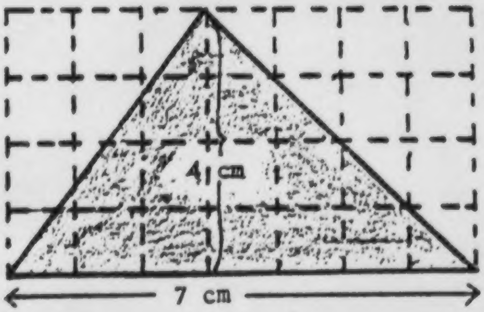


Chapter 2 Name _______________________

Quiz 1 (Lessons 1 - 3) Date _______________________

1. Simplify each expression.

_____ a. $2 + 3 \cdot 4 + 5$

_____ b. $6 \cdot (7 - 2 + 3)$

_____ c. $\frac{36 \div 9 + 12}{12 + 12}$

2. Calculate.

_____ a. The difference of 7 and $6\frac{1}{3}$.

_____ b. The sum of 20 and the product of 2 and 3.

3. Write the following in words: $\frac{8 + 4}{2}$

4. Three examples of a pattern are given. Describe the pattern using variables.

a. $\frac{3}{7} + \frac{3}{7} + \frac{3}{7} = 3 \cdot \frac{3}{7}$

$8 + 8 + 8 = 3 \cdot 8$

$43.2 + 43.2 + 43.2 = 3 \cdot 4.32$

Description: _______________

b. $5 \cdot (4 + 1) = 5 \cdot 4 + 5 \cdot 1$

$\frac{2}{3} \cdot \left(\frac{1}{3} \cdot 1 \right) = \frac{2}{3} \cdot \frac{1}{3} + \frac{2}{3} \cdot 1$

$2 \cdot (11.3 + 17) = 2 \cdot 11.3 + 2 \cdot 17$

Description: _______________

5. Examine the following true statements:

$$\begin{aligned} 10 \cdot 11 &> 10 + 11 \\ {}^-3 \cdot {}^-4 &> {}^-3 + {}^-4 \\ 27 \cdot 2 &> 27 + 2 \end{aligned}$$

a. Describe what seems to be the pattern. Use words.

b. Is the pattern always true for real numbers? Explain why or why not.

Chapter 2 Name______________________

Quiz 2 (Lessons 4 and 5) Date______________________

1. Suppose $x = 5$, $y = \frac{1}{3}$, $a = 2$, $b = 3$, $c = 15$, and $d = 12$. Find the value of each expression below.

_____ a. $3x$

_____ b. $40 - 30y$

_____ c. ba

_____ d. $\frac{c + d}{c - d}$

_____ e. $c - (a + d)$

_____ f. $x \div c \cdot y$

2. Let P, ℓ, and w be the perimeter, length, and width of a rectangle. Then $P = 2\ell + 2w$.

_____ a. Find P when $\ell = 15$ and $w = 12$.

_____ b. What is the perimeter of a rectangle with length 20 centimeters and width 7 centimeters?

3. Translate each sentence into a mathematical formula.

________________ a. The circumference C of a circle is the product of 2π and the radius r.

________________ **b.** The profit P of a company is equal to the difference of the selling price S and the cost C.

Chapter 2 Name ______________________

Quiz 3 (Lessons 6 - 8) Date ______________________

__________ 1. a. The replacement set for the variable v is {2, 3, 8}. Then what values can $2v + 1$ have?

__________ b. In the formula for finding the area of a rectangle, $A = \ell w$, what set of numbers is understood to be the replacement set for ℓ?

__________ 2. Five numbers are given below. Name those that are solutions to the sentence: $^{-}3 > x$.

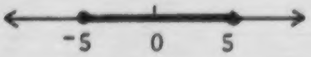
$^{-}3$ $^{-}4$ $^{-}2$ $^{-}5$ $^{-}1$

3. Match the sentences with the graph of its solution. The replacement set for each variable is the set of all real numbers.

______ a. $^{-}5 \geq y$

______ b. $^{-}5 < y$

______ c. $^{-}5 < y < 5$

(1)


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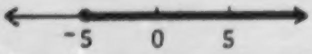

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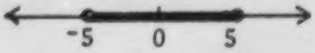

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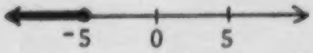


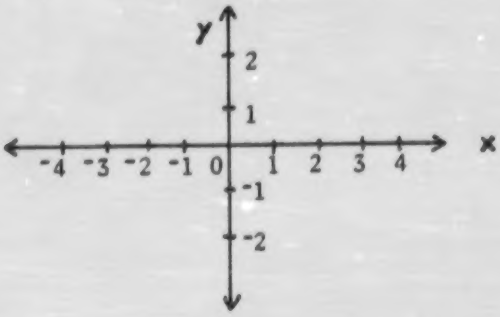
4. Assume the set of real numbers is the replacement set for the variable. Graph all solutions for $a \geq 6\frac{1}{3}$.

5. Graph the following points, labeling the points by letter.

a. $A(0, {}^{-}1)$

b. $B(2\frac{1}{2}, 0)$

c. $C({}^{-}1, {}^{-}2)$



Chapter 2 Test

Name ____________________

Date ____________________

1. Evaluate each expression.

_____ a. $3 \cdot 4 \div 2$

_____ b. $7 + 2 \cdot 3 - 9$

_____ c. $\frac{15 - 7}{72 - 68}$

_____ d. $\frac{2(4 - 2)}{32 \div 16 + 16}$

2. Three examples of a pattern are given. Describe the pattern using variables.

a. $7 + 6 + 5 = 7 + 5 + 6$

Description: ________________

$\frac{2}{3} + \frac{7}{8} + \frac{9}{10} = \frac{2}{3} + \frac{9}{10} + \frac{7}{8}$

$16.4 + 18.2 + 9.0 = 16.4 + 9.0 + 18.2$

---

b. $7 + 2 \cdot 3 = 7 + 3 + 3$

Description: ________________

$\frac{2}{3} + 2 \cdot 6 = \frac{2}{3} + 6 + 6$

$1.8 + 2 \cdot \frac{3}{4} = 1.8 + \frac{3}{4} + \frac{3}{4}$

3. Suppose that $p = 6$, $n = 4$, and $m = 8$. Find the value of each expression below.

_____ a. the product of 5 and p

_____ b. $10 + n - 2m$

_____ c. nm less 10

_____ d. $\frac{np}{m}$

_____ e. $m - (p - n)$

_____ f. $n + p \cdot m + p$

4. The number C of couples that can be formed from n persons is found by the formula $C = \frac{n(n - 1)}{2}$

__________ a. How many couples are possible from 20 people?

__________ b. What does C equal when $n = 15$?

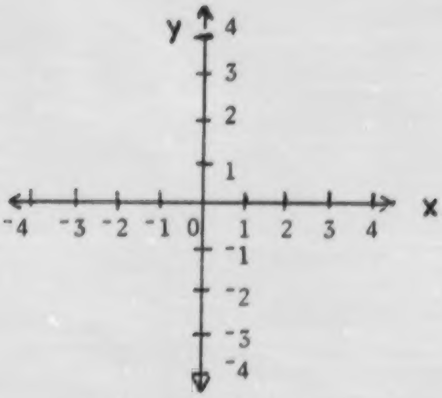
__________ 5. a. Translate the following sentence into a mathematical formula:
To find Fahrenheit temperature F, multiply the Celsius temperature C by $\frac{9}{5}$ then add 32.

__________ b. Find the Fahrenheit temperature when Celsius is 30°.

(Go on to the next page.)

6. Graph the following points, labeling the points by letter.

a.	$A(0, 3)$	d.	$D(^-2, 0)$
b.	$B(3, 4)$	e.	$E(1, ^-2)$
c.	$C(^-1, 3)$	f.	$F(^-1.5, ^-.5)$



_______________ 7. The replacement set for the variable x is $\{6, 8, 2\}$. Then what values can $20 - 2x$ have?

_______________ 8. What is the replacement set for the number of trees growing in a schoolyard?

_______________ 9. Six numbers are given below. Identify the solutions to the sentence: $^-2 < y < 2$.

$3 \qquad ^-3 \qquad 2 \qquad ^-1 \qquad 1 \qquad ^-4$

10. Assume the set of real numbers is the replacement set for the variable. Graph all solutions to $^-5 < t \leq 7$.

11. The heights and weights of 4 students are given in the following table. Let H_n and W_n represent the height and weight of student n.
What is:

STUDENT	HEIGHT(cm)	WEIGHT(kg)
1	120.0	46
2	115.5	50
3	165.1	57
4	177.0	64

__________ a. H_3

__________ b. $\frac{1}{2}(W_2 + W_4)$

12. Write the following in words:

a. $20 - 7.5$

b. $15 \div \frac{4}{5}$

ANSWER KEY

Chapter 2, Quiz 1 *(10 points)*

(3) 1. a. 19 b. 48 c. $\frac{2}{3}$

(2) 2. a. $7 - 6\frac{1}{3} = \frac{2}{3}$ b. $20 + (2 \cdot 3) = 26$

(1) 3. Answers may vary. Example: The sum of 8 and 4 divided by 2.

(2) 4. a. $x + x + x = 3x$ b. $x(y + z) = x \cdot y + x \cdot z$

(2) 5. a. The product of two numbers is greater than their sum.

b. No, for example, $0 \cdot 3 \neq 0 + 3$.

Chapter 2, Quiz 2 *(10 points)*

(6) 1. a. 15 b. 30 c. 6 d. 9 e. 1 f. $\frac{1}{9}$

(2) 2. a. 54 b. 54

(2) 3. a. $C = 2\pi r$ b. $P = S - C$

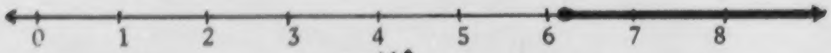
Chapter 2, Quiz 3 *(10 points)*

(2) 1. a. 5, 7, 17 b. The set of nonnegative numbers.

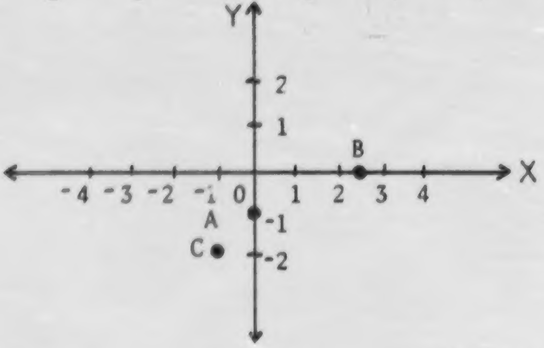
(1) 2. $^{-}4$, $^{-}5$

(3) 3. a. (4) b. (2) c. (3)

(1) 4.



(3) 5.



(Go on to the next page.)

Chapter 2 Test *(50 points)*

(8) 1. a. 6 b. 4 c. 2 d. $\frac{2}{9}$

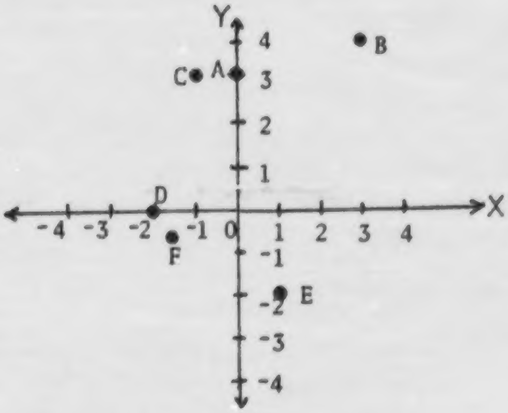
(4) 2. a. $w + v + x = w + x + v$ b. $w + 2x = w + x + x$

(12) 3. a. 30 b. $^{-}2$ c. 22 d. 3 e. 6 f. 58

(4) 4. a. 190 couples b. 105 couples

(4) 5. a. $F = \frac{9}{5}C + 32$ b. 86° F

(6) 6.

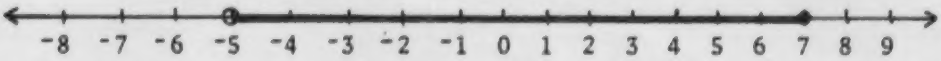


(3) 7. 8, 4, 16

(1) 8. Set of all nonnegative integers.

(2) 9. $^{-}1$, 1

(2) 10.



(2) 11. a. 165.1 cm b. 57 kg

(2) 12. Answers may vary. Here are some examples:

a. 7.5 from 20

b. The sum of 15 and $\frac{4}{5}$.

Chapter 3 - Addition and Subtraction

Lesson 1: Models for Addition, pp. 120 - 127

Objective: To recognize when the union or joining models of addition apply.

Vocabulary: model, union, joining

Symbols: $\cup$

Comments: Read T3-1 through T3-4.

Students should be able to read the lesson on their own and answer the QCR. Come together as a class to discuss the reading and their answers to the QCR before assigning the QTU.

Be sure to discuss QD #1 and 2 as a class. These problems and the examples on page 122 describe situations when the addition models do not apply.

Suggested Assignments:
1) QCR
2) QTU: #2 - 8 (even numbers)

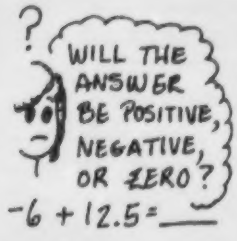
Lesson 2: The Slide Model for Addition, pp. 128 - 132

Objectives:
1) To recognize when the slide model for addition applies.
2) To add two or more real numbers.

Vocabulary: slide

Comments: Read T3-5.

Students should be provided with practice in reading aloud and writing expressions like "$^{-}3 + 11$." For example, you may want to ask students to read the problems in QTU #1 - 17 aloud before they give the answers.


?
WILL THE ANSWER BE POSITIVE, NEGATIVE, OR ZERO?
-6 + 12.5 = ____

Students should be able to determine whether a sum will be positive, negative, or zero before actually computing. You may want to do some oral exercises with the class to provide practice in this skill.

Be sure to allow time for students to share their examples of real-life situations for QTU #1 - 4.

Suggested Assignments:
1) QCR: #1 - 15, 17 - 25 (odd numbers)
2) QTU: #1 - 17, 19, 21, 23, 25

QUIZ 1 Anytime after Lesson 2

Lesson 3: The Assemblage Property of Addition, pp. 132 - 137

Objective: To distinguish and apply the commutative and associative (assemblage) properties of addition.

Vocabulary: assemblage, commutative, associative

Comments: Read T3-7.

PROBLEM SOLVING

STRATEGIES

You may want to begin the lesson by going through the problem on page 132 (or one similar to) with the class. Ask questions such as:

--- What is the problem?
--- What information is given?
--- What are you to find?
--- Is there another way to solve the problem?
--- What is the answer to the problem?
--- Did the answer check?

Questions like these should also be asked in the discussion of QTU #1 - 5. It is hoped that students in time will ask themselves these questions when solving problems.

Suggested Assignments:
1) QCR; QTU: #1, 3, 5, 6 - 9
2) QTU: #10 - 18, QD

Lesson 4: Zero and Addition, pp. 138 - 140

Objective: To distinguish and apply the properties of zero in addition, which consist of the additive identity property and the property of opposites.

Vocabulary: additive identity

Comments: Read T3-8.

Suggested Assignments: QCR, QTU

QUIZ 2 Anytime after Lesson 4

Lesson 5: Subtraction, pp. 140 - 145

Objectives:
1) To subtract any two real numbers
2) To realize that subtracting a number is the same as adding its opposite.

Comments: Read T3-8.

You may want to read through the lesson with the students. Discuss the examples given as well as some of the QCR.

Students should be provided with practice in determining whether the answer to a subtraction problem will be positive, negative, or zero before actually computing.

ORAL DRILLS Do some addition and subtraction of integers problems orally with the class. You may also want to flash a problem one at a time on the overhead projector, allowing students a few seconds to write their answers on their papers or to give the answers aloud.

Suggested Assignments:
1) QCR
2) QTU: #1 - 26

Lesson 6: Models for Subtraction, pp. 145 - 153

Objective: To recognize when the take-away, cutting off, and comparison models of subtraction apply.

Vocabulary: take-away, cutting off, directed distance

Comments: Read T3-9 and T3-10.

Read through the lesson as a class. The directed distance model should be reviewed carefully.

Oral exercises may be conducted in which students think of and discuss real life illustrations of each model for given subtraction problems.

Suggested Assignments: QCR, QTU: #9 - 23

QUIZ 3 Anytime after Lesson 6

Lesson 7: A Statistic - The Mean, pp. 153 - 157

Objective: To calculate the mean of any collection of real numbers.

Vocabulary: statistic, mean, average, arithmetic mean

Materials Needed: meter stick, 3 equal weights, and string for QDE #2

Comments: Read T3-11.

You may want to have a student demonstrate the exploration activity on page 157 (QDE #2). A meter stick, 3 equal weights, and string will be needed.

Suggested Assignments: QCR, QTU: #1, 4, 5, 7, 10, 11, 13, 14

Lesson 8: A Statistic - The Mean Absolute Deviation, pp. 158 - 162

Objective: To calculate the absolute value of any real number.

Vocabulary: absolute value

Symbols: $|\quad|$

Comments: Read T3-12.

Have students read only about finding absolute values on pages 159 - 160. They should omit the reading about the mean absolute deviation.

Suggested Assignments: QCR: #1 - 18

Lesson 9: Distance, pp. 164 - 168

Objective: To calculate the distance between any two real numbers.

Vocabulary: distance, error

Comments: Read T3-13.

Have students read pages 165 and 166 in the lesson. Page 164 should be omitted since the reading is about mean absolute deviation.

Using the definition of distance between two numbers, remind students that the absolute value of any number is its distance from 0. (e.g., $|a - 0| = |a|$)

Suggested Assignments: QCR: #1 - 18, QAR: #1 - 6

Chapter Summary

Comments: Have students read and discuss the summary.

Chapter 3 Test

Chapter 3 Name ____________________

Quiz 1 (Lessons 1 - 2) Date ____________________

1. Simplify.

__________ a. $^{-}250 + {}^{-}132$

__________ b. $^{-}18 + 29$

__________ c. $73.6 + {}^{-}42.8$

2. Write the addition problem suggested by each situation and give the answer.

__________ a. Withdrawing $25, then withdrawing $15.

__________ b. Raising a flag 13 meters, then lowering it 6 meters.

__________ 3. Jean weighs 110 lb. and Karen weighs y lb. How much do they weigh together?

4. a. Translate this addition problem into a real-life situation: $100 + {}^{-}32$.

__________ b. Perform the addition.

__________ 5. Let $R = \{2, 3, 4, 5\}$ and $S = \{0, 1, 6, 9, 10\}$. Find $R \cup S$.

__________ 6. Show using slides: $^{-}10 + 8$. What is the answer?

Chapter 3 Name ____________________

Quiz 2 (Lessons 3 - 4) Date ____________________

1. Simplify.

________ a. $\frac{7}{8} + 0 + \frac{5}{8} + \frac{-7}{8}$ ________ c. $18 + {}^-5 + 18$

________ b. ${}^-9.2 + {}^-6.8 + 10$ ________ d. $2 + {}^-5 + 8 + 5 + {}^-6$

2. Which property of addition (commutative, associative, additive identity properties, property of opposites) is described?

________ a. $12a + 18 = 18 + 12a$

________ b. ${}^-234 + 0 = {}^-234$

________ c. $(5 + 7) + (2a + 2b) = (2a + 2b) + (5 + 7)$

________ d. $\frac{5}{8} + (\frac{1}{2} + \frac{2}{3}) = (\frac{5}{8} + \frac{1}{2}) + \frac{2}{3}$

________ 3. Mr. Lee makes deposits and withdrawals from his checking account.

		Deposit	Withdrawal
August	1	\$ 300.00	
	6		\$ 75.00
	10		\$ 100.00
	15	\$ 300.00	
	20		\$ 275.00
	27		\$ 150.00
September	1	\$ 250.00	

At the end of the day on September 1, how much was in the account?

Chapter 3 Name __________________

Quiz 3 (Lessons 5 - 6) Date __________________

1. Write the subtraction problem suggested by each situation and give the answer:

__________ a. A woman walked up 23 steps, then walked down 40. On which step is she?

__________ b. A temperature of $^{-}6^\circ$ falls 4°. What is the new temperature?

2. Simplify.

__________ a. $^{-}8 - {}^{-}11$

__________ c. $0 - 17$

__________ b. $^{-}14 - 2\frac{1}{2}$

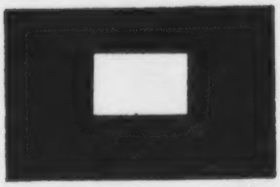
__________ d. $12 - {}^{-}4$

3. Let $t = 3$, $u = {}^{-}10$, and $v = 8$. Calculate.

__________ a. $v - t - u$

__________ b. $t - 4u$

__________ 4. The area of the larger rectangle on the right is 40. The smaller rectangle has area 6. What is the area of the shaded region?



__________ 5. Honolulu High School had 3468 students. Now it has x students. What is the change in number of students?

Chapter 3 Test

Name ______________________

Date ______________________

1. Simplify.

______ a. $0 + {}^{-}42.2$

______ b. ${}^{-}6 - {}^{-}12$

______ c. $|{}^{-}16|$

______ d. $\frac{1}{2} + {}^{-}6$

______ e. $8 - {}^{-}3$

______ f. ${}^{-}17 + {}^{-}18$

______ g. ${}^{-}13.5 - 6.5$

______ h. $11 + {}^{-}85$

______ i. ${}^{-}180 + 160$

______ j. $6 + {}^{-}|{}^{-}6|$

______ 2. Write the following question as an addition problem and solve it: Michael received $20 and then spent $15.75. How much money did he have left?

______ 3. On 4 carries a football player lost 3 yards, gained 9 yards, lost 2 yards, and gained 2 yards. What was the result?

4. Suppose $\frac{1}{4}$ cup of flour is added to $\frac{3}{4}$ cups of water. Does the result fill up a cup? Why or why not?

______ 5. Mike has $99 in his checking account and mistakenly writes a check for $108. By how much is the account overdrawn?

6. Calculate the mean of each group of data:

______ a. test scores: 72, 50, 26, 30

______ b. temperature changes: $0, {}^{-}5, {}^{-}10, 2, 3$

(Go on to the next page.)

7. Find the distance between:

__________ a. 3 and $^{-}7$

__________ b. d and 8

8. Translate each problem below into a real-life situation. Then give the answer.

a. $^{-}16.50 + {}^{-}18$

b. $9 - 12$

9. What property is used in each step?

__________ a. $16 + ({}^{-}9 + {}^{-}16) = 16 + ({}^{-}16 + {}^{-}9)$

__________ b. $= (16 + {}^{-}16) + {}^{-}9$

__________ c. $= 0 + {}^{-}9$

__________ d. $= {}^{-}9$

__________ 10. It was estimated that Company Q would lose $10,000 this year. Instead Company Q showed a profit of $50,000. What was the error in the estimate?

__________ 11. Henry predicted 30 cm of snow, Mary predicted 45 cm. 38 cm of snow fell. Who was more accurate? Explain why.

(Go on to the next page.)

12. Evaluate each expression when $u = {}^{-}1$, $v = 4$, $w = 5$, and $x = {}^{-}2$.

____________ a. $uv - uw$

____________ b. $x - 3w$

____________ c. $v - (w - u)$

____________ d. $u + v + w + x$

____________ 13. Multiple-Choice: If $25 - x = 30$, then $x =$ __?__.

a. 55 b. 5 c. ${}^{-}5$ d. ${}^{-}55$

____________ 14. If Carol is y years old, how old is her sister who is four years younger?

____________ 15. Pick all correct answers: $x - y =$ __?__.

a. $-y + x$ b. $y - x$ c. $x + -y$ d. $x + y$

____________ 16. If you purchase 2 pounds of apples and y pounds of oranges, how many pounds did you purchase in all?

ANSWER KEY

Chapter 3, Quiz 1 *(10 points)*

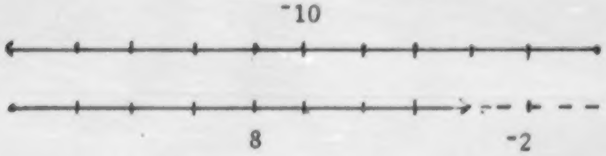
(3) 1. a. $^{-}382$ b. 9 c. 30.8

(2) 2. a. $^{-}25 + {}^{-}15 = {}^{-}40$ b. $13 + {}^{-}6 = 7$ *(1)* 3. $(110 + y)$ lb.

(2) 4. a. Answers will vary. Here is an example: winning $100, then losing $32. b. 68

(1) 5. $\{0, 1, 2, 3, 4, 5, 6, 9, 10\}$

(1) 6.



Answer: $^{-}2$

Chapter 3, Quiz 2 *(10 points)*

(4) 1. a. $\frac{5}{8}$ b. $^{-}6$ c. $^{-}5$ d. 4

(4) 2. a. commutative b. additive identity c. commutative
d. associative *(2)* 3. $250

Chapter 3, Quiz 3 *(10 points)*

(2) 1. a. $23 - 40 = {}^{-}17$ She is on the step that is 17 steps below where she started.

b. $^{-}6 - 4 = {}^{-}10$ The new temperature is $^{-}10°$.

(4) 2. a. 3 b. $^{-}16\frac{1}{2}$ c. $^{-}17$ d. 16

(2) 3. a. 15 b. 43 *(1)* 4. 34 *(1)* 5. $x - 3468$ more students

Chapter 3 Test *(50 points)*

(10) 1. a. $^{-}42.2$ b. 6 c. 16 d. $^{-}5\frac{1}{2}$ e. 11 f. $^{-}35$

g. $^{-}20$ h. $^{-}74$ i. $^{-}20$ j. 0

(2) 2. $20 + {}^{-}15.75 = 4.25$ He ended up with $4.25.

(2) 3. $^{-}3 + 9 + {}^{-}2 + 2 = 6$ The result was a gain of 6 yards.

(2) 4. No, it does not fill up a cup. The flour dissolves and mixes with the water in a way which is not exactly joining.

(Go on to the next page.)

(2) 5. His account is overdrawn by $9. *(4)* 6. a. 44.5 b. $^{-}2$

(4) 7. a. $|3 - {}^{-}7| = 10$ b. $|d - 8|$

(4) 8. Answers may vary. Here are some examples:

a. Karen withdrew $16.50 from her account on Friday and withdrew $18 on Monday. How much did she withdraw in all?
Answer: She withdrew $34.50.

b. The football team gained 9 yards then lost 12 yards. What was their net yardage?
Answer: The net yardage was 3 yards.

(4) 9. a. commutative b. associative c. property of opposites
d. additive identity

*(2)*10. $|{}^{-}10{,}000 - 50{,}000| = \$60{,}000$

*(2)*11. Mary was more accurate. Her error of estimation was 7 cm as compared to Henry's error of estimation (8 cm).

*(8)*12. a. 1 b. $^{-}17$ c. $^{-}2$ d. 6 *(1)* 13. (c) or $^{-}5$

*(1)*14. y - 4 years old *(1)* 15. (a) and (c) or $x - y = {}^{-}y + x = x + {}^{-}y$

*(1)*16. 2 + y pounds

Chapter 4 - Multiplication

Lesson 1: The Repeated Addition Model for Multiplication, pp. 173 - 179

Objective: To recognize when the repeated addition model for multiplication applies in a situation.

Vocabulary: term

Comments: Read T4-1 through T4-3.

Students should be able to read the lesson on their own and answer the QCR.

Following are possible questions to ask when discussing questions like QCR #21 on page 176:

UNDERSTAND --- What is the problem?
--- What does it mean by "mean score"?
--- What information is given?
PLAN --- Have you solved a problem like this before?
--- What will you need to compute?
CARRY OUT PLAN --- Can you explain the steps you took to solve the problem?
--- Is the question answered?
LOOK BACK --- Is the answer reasonable?

Suggested Assignments:
1) QCR: #1 - 8, 9 - 23 (odd numbers)
2) QTU: #1 - 7, 9 - 17 (odd numbers), 19, 22

Lesson 2: The Ordered Pair Model for Multiplication, pp. 179 - 184

Objectives:
1) To recognize when the ordered pair model for multiplication applies in a situation.
2) To apply the fundamental counting principle to problem solving situations.

Vocabulary: tree diagram

Comments: Read T4-5.

Have students explain their answers to the questions by one of the following models: tree diagram, horizontal-vertical graphing, filling blanks, or connecting points.

Suggested Assignments:
1) QCR
2) QTU: #1 - 12

QUIZ I Anytime after Lesson 2

Lesson 3: The Area Model for Multiplication, pp. 187 - 193

Objective: To recognize when the area model for multiplication applies in a situation.

Vocabulary: units

Comments: Read T4-6 and T4-7.

You may want to read through the lesson as a class. Go over the examples carefully. However, remember that it is NOT crucial for the students to know how to picture multiplication of fractions using area. It is important that they know that multiplication can be pictured in some way.

Suggested Assignments:
1) QCR: #1 - 3, 4, 5, 9 - 12, QTU: #1 - 6
2) QTU: #11 - 17, 18, 20, 22

Lesson 4: The Assemblage Properties of Multiplication, pp. 193 - 198

Objectives:
1) To distinguish and apply the commutative and associative (assemblage) properties of multiplication.
2) To find the volume of a solid given its dimensions.

Vocabulary: volume, cubic

Materials Needed: physical models such as boxes

Comments: Read T4-8.

USE MODELS

Students should already be familiar with finding volumes, but a review may be necessary. You may want to use physical models (e.g., boxes), to show the students how to find volume.

Suggested Assignments:
1) QCR
2) QTU: #1 - 13

QUIZ 2 Anytime after Lesson 4

Lesson 5: The Size Change Model for Multiplication, pp. 198 - 203

Objective: To recognize when the size change model for multiplication applies in a situation.

Vocabulary: scale factor

Comments: Read T4-9.

MISLEADING GRAPHS

Be sure to discuss QD #2 on page 203 where the size change model is incorrectly used in a bar graph. In a bar graph, only the lengths of the bars change with scale factor differences. You may want to show other examples of misleading graphs.

Suggested Assignments:

1) QCR: (even numbers)
2) QTU: #1, 4 - 10, QD

Lesson 6: Multiplication with Negative Numbers, pp. 204 - 212

Objectives:

1) To be able to multiply two or more real numbers.
2) To be able to combine calculations with multiplication, addition, and subtraction.

Vocabulary: multiplier

Materials Needed: pair of gears, pair of pulleys (if available)

Comments: Read T4-10 and T4-11.

You may want to read through the lesson as a class. Have students do some multiplication problems orally.

USE REAL MODELS

Demonstrate the clockwise and counterclockwise motions of a pair of gears and/or pulleys to students who may find it difficult to imagine such complimentary yet contrasting systems working.

Suggested Assignments:

1) QCR
2) QTU: #1 - 6, 10 - 29

QUIZ 3 Anytime after Lesson 6

Lesson 7: Multiplication by 1 and $^{-}1$, pp. 212 - 215

Objective: To distinguish and apply the properties of multiplication by 1 and $^{-}1$.

Vocabulary: multiplicative identity, oppositing properties of $^{-}1$

Comments: Read T4-12.

You may want to review examples 1 and 2 on pages 213 and 214 as a class.

Suggested Assignments:
1) QCR
2) QTU

Chapter Summary

Comments: Have students read and discuss this section.

Chapter 4 Test

Chapter 4

Quiz 1 (Lessons 1 - 2)

Name ______________________

Date ______________________

1. Simplify.

__________ a. m + 10 + m + 10 + m + m

__________ b. x + x + y + y + x + y + x

__________ 2. a. Suppose you walk $3\frac{1}{2}$ km a day for d days. Write how far you walked as repeated addition.

__________ b. How far would you walk in 8 days?

3. Show that each problem described below fits the ordered pair model for multiplication by drawing a tree diagram, horizontal-vertical graphing, filling blanks, or connecting points. Then answer the question.

a. There are 6 men and 7 women. How many man/woman pairs can be formed?

b. A classroom has five rows, each with eight seats. How many seats are in the classroom?

__________ 4. You score 95 on 3 tests and 90 on 2 others. What is your mean score?

__________ 5. If you have 2 pairs of tennis shoes and p pairs of tennis socks, how many combinations of shoes and socks could you wear?

Chapter 4 Name ____________________

Quiz 2 (Lessons 3 - 4) Date ____________________

1. Simplify in as easy a way as you can:

__________ a. $5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 \cdot \frac{1}{5} \cdot \frac{1}{4} \cdot \frac{1}{3} \cdot \frac{1}{2}$

__________ b. $5 \cdot 5 \cdot 5 \cdot 20 \cdot 20 \cdot 20$

__________ c. ab - ba + ab

__________ d. $1000 \cdot 100 \cdot 10 \cdot 0$

2. a. Multiply the given numbers. Show all work.

$$\begin{array}{r} 6.3 \\ \underline{\times\ 2.1} \end{array} \qquad\qquad \begin{array}{r} 2.1 \\ \underline{\times\ 6.3} \end{array}$$

__________ b. What property of multiplication is verified by (a) above?

__________ 3. Given a rectangle with dimensions ℓ and w and a second rectangle with dimensions 2ℓ and 2w. How do the areas compare?

__________ 4. 12 men worked for $6\frac{1}{2}$ days. How many man-days did they work?

__________ 5. A rectangular solid has dimensions 2 cm, 3 cm, and 4 cm. Give the dimensions of a second rectangular solid with different dimensions, but the same volume.

__________ 6. A fish tank had dimensions 40 cm by 30 cm by 20 cm. One cubic centimeter of water weighs 1 gram. How many grams of water will fill the tank?

Chapter 4 Name ____________________

Quiz 3 (Lessons 5 - 6) Date ____________________

1. Simplify.

__________ a. $^-6 \cdot {}^-3$

__________ b. $2.9 \cdot {}^-2$

__________ c. $^-3 \cdot {}^-3 \cdot {}^-3$

__________ d. $^-5 \cdot {}^-3 + 4 \cdot {}^-2$

__________ e. $^-12 \cdot 0 \cdot \frac{1}{3}$

__________ 2. A union is negotiating for a 6% cost of living increase. The mean wage is now \$5 per hour. The increase would make the mean wage __?__ per hour.

__________ 3. Suppose you are looking through a microscope which magnifies 100 times. An object 0.05 mm in length will seem to have what length in the microscope?

__________ 4. The price of a \$200 rug is reduced 10%. What is the scale factor?

__________ 5. In temperatures, $F = \frac{9}{5} C + 32$. Give the value of F when $C = {}^-30°$.

__________ 6. Suppose $y = 3z + 4 - 2x$. Find y when $x = {}^-10$ and z is $^-15$.

Chapter 4 Test

Name ________________________

Date ________________________

1. Simplify.

________ a. $0 \cdot \frac{^-2}{3} \cdot 12$

________ b. $^-12 \cdot {^-2} \cdot {^-2}$

________ c. $^-3.6 \cdot {^-2.1}$

________ d. $^-13 \cdot 1 \cdot {^-6}$

________ e. $^-1 \cdot {^-1} \cdot {^-1} \cdot {^-1} \cdot {^-1}$

________ f. $-a \cdot -b + ab$

________ g. $6 + {^-4} \cdot 2$

________ h. $2 + {^-1} \cdot e$

________ i. $^-2 \cdot ({^-3} - {^-5} + 1)$

________ j. $3 \cdot (1 - 100)$

2. The multiplication models are: repeated addition, ordered pair, area (volume), and size change. Answer each question and specify which model for multiplication was used.

   a. There were 28 men and 30 women at a dance. How many couples were possible?

      Answer: ________ Model: ________________________

   b. A bookstore gave a 20% discount on all $12 books. How much was the sale price?

      Answer: ________ Model: ________________________

   c. The temperature dropped 2° everyday for 7 days. How much did the temperature decline?

      Answer: ________ Model: ________________________

   d. How much carpeting is required to cover all floor space in a room 3 meters long and w meters wide?

      Answer: ________ Model: ________________________

   e. Of 700 people polled, $\frac{1}{5}$ preferred Brand X to Brand Y. How many preferred Brand X?

      Answer: ________ Model: ________________________

3. Each situation leads naturally to a size change model of multiplication. Name the scale factor.

________ a. The population of a city is 30,000. Growth is estimated at 2% annually.

________ b. Mr. Lee made $10,000 last year. This year he will make twice as much.

(Go on to the next page.)

4. Simplify.

__________ a. $p + p + r + r + p$ __________ c. $-B + 10 + -B + 10 + -B$

__________ b. $m + 3 + 3 + 3 + m + m + m$ __________ d. $\underbrace{\frac{1}{5} + \frac{1}{5} + \dots \frac{1}{5}}_{n \text{ terms}}$

__________ 5. Find the average of 2 scores of s_1 and 5 scores of s_2.

6. Show that this problem fits the ordered pair model by drawing a tree diagram: There are 5 teams in a basketball league. How many games are needed if each team is to play the other teams on its home court?

7. Simplify.

__________ a. $xyz + 2yxz + -xyz$

__________ b. $3 \cdot 3 \cdot 3 \cdot 10 \cdot 10 \cdot 10$

__________ c. $\frac{1}{2} \cdot \frac{2}{3} \cdot \frac{3}{4} \cdot \frac{4}{3} \cdot \frac{3}{2} \cdot \frac{2}{1}$

8. Name the property for each of the following:

__________ a. $x \cdot y = y \cdot x$

__________ b. $^{-}1 \cdot f = -f$

__________ c. $2 + 1 \cdot 8 = 2 + 8$

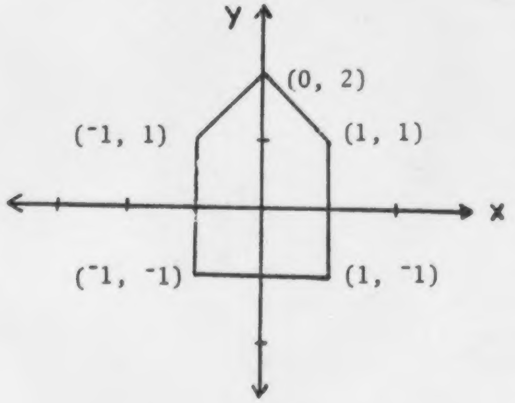
__________ d. $8 \cdot 9 \cdot 10 = 8 \cdot (9 \cdot 10)$

9. Use rectangles to show that $\frac{1}{3} \cdot \frac{1}{5} = \frac{1}{15}$.

__________ 10. a. What is the volume of a rectangular solid with dimensions 3, 4, 5?

__________ b. What happens to its volume when you multiply all of its dimensions by 2?

11. Apply a size change of $\frac{^-1}{2}$ to the figure. Put the resulting figure on the same graph.



ANSWER KEY

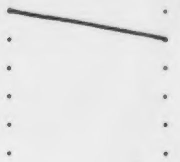
Chapter 4, Quiz 1 *(10 points)*

(2) 1. a. $4m + 20$ b. $4x + 3y$

(2) 2. a. $\underbrace{3\frac{1}{2} + 3\frac{1}{2} + \dots + 3\frac{1}{2}}_{\text{d terms}}$ b. 28 km

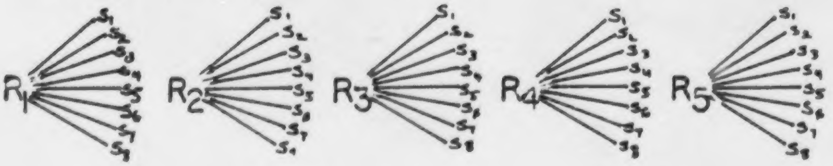
(2) 3. Answers may vary. Here are some examples:

a. There are 42 segments connecting the 6 points at the left (represent the 6 men) to the 7 points at the right (represent the 7 women). One of the segments is drawn.



Answer: 42 man/woman pairs

b. Each row has 8 seats.



Answer: 40 seats in the classroom

(4) 4. 93 5. $2p$

Chapter 4, Quiz 2 *(10 points)*

(4) 1. a. 1 b. 1,000,000 c. ab d. 0

(2) 2. a.

$$\begin{array}{r} 6.3 \\ \underline{2.1} \\ 63 \\ \underline{12\,6} \\ 13.23 \end{array} \qquad \begin{array}{r} 2.1 \\ \underline{6.3} \\ 63 \\ \underline{12\,6} \\ 13.23 \end{array}$$

b. commutative property

(1) 3. The rectangle with dimensions 2ℓ and $2w$ has 4 times the area of the rectangle with dimensions ℓ and w.

(1) 4. 78 man-days

(1) 5. a rectangular solid with dimensions 1 cm, 3 cm, and 8 cm

(1) 6. 24,000 grams

(Go on to the next page.)

Chapter 4 Answer Key - Page 2

Chapter 4, Quiz 3 *(10 points)*

(5) 1. a. 18 b. $^-5.8$ c. $^-27$ d. 7 e. 0

(5) 2. \$5.30 3. 5 mm 4. 10% 5. $^-22°$ 6. $^-21$

Chapter 4 Test *(50 points)*

(10) 1. a. 0 b. $^-48$ c. 7.56 d. 78 e. $^-1$ f. 2ab

g. $^-2$ h. 2 - e i. $^-6$ j. $^-297$

(10) 2. a. Answer: 840 couples Model: ordered pair

b. Answer: \$9.60 Model: size change

c. Answer: 14° Model: repeated addition

d. Answer: 3w sq. m Model: area

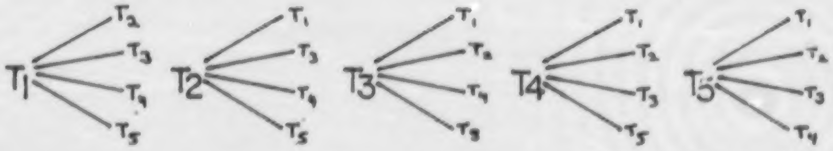
e. Answer: 140 people Model: size change

(4) 3. a. 2% b. 2

(4) 4. a. 3p + 2r b. 4m + 9 c. $^-3B + 20$ d. $\frac{1}{5}n$

(2) 5. $\frac{2s_1 + 5s_2}{7}$

(2) 6.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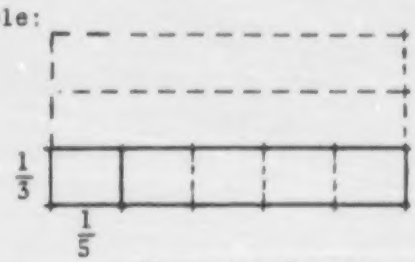
T4

(6) 7. a. 2xyz b. 27,000 c. 1

(4) 8. a. commutative property b. oppositing property of $^-1$

c. multiplicative identity d. associative property

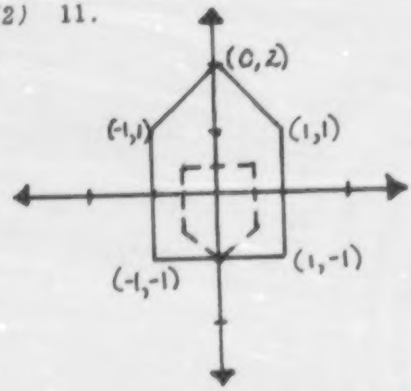
(2) 9. Answers may vary. Here is an example:


$\frac{1}{3}$
$\frac{1}{5}$

(Go on to the next page.)

(4) 10. a. 60 b. The volume is increased 8 times.

(2) 11.


(0,2)
(-1,1)
(1,1)
(-1,-1)
(1,-1)

Chapter 5 - Models for Division

Lesson 1: The Splitting Up Model for Division, pp. 217 - 221

Objectives:
1) To give the reciprocal of any number, realizing that all divisions can be converted to multiplication.
2) To divide any two real numbers.
3) To recognize when to use division in a situation (namely, when the splitting up model applies).

Vocabulary: splitting up, reciprocal

Comments: Read T5-1 through T5-3.

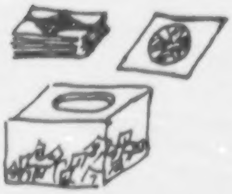
Suggested Assignments:
1) QCR
2) QTU and Multiplication and Division of Real Numbers Worksheets (W5-8 and W5-9)

Lesson 2: Probability of Outcomes, pp. 221 - 225

Objective: To calculate the probability of any outcome given an experiment with easily countable random outcomes.

Vocabulary: probability, equally likely, fair, unbiased, random, randomly

Comments: Read T5-4. (Note that the students should be made aware of the similarities and differences between probability and relative frequency.)



Discuss with students other situations with equally likely outcomes: picking a card from a deck of cards, spinning a spinner; picking a winning number in a lottery, and so on.

Be sure to have students explain the probability they give for a situation.

Suggested Assignments: QCR, QTU

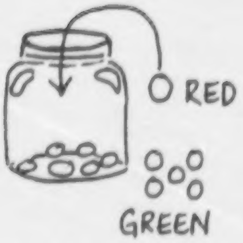
Lesson 3: Probability of Events, pp. 226 - 232

Objective: To calculate the probability of any event given an experiment with easily countable random outcomes.

Vocabulary: event

Comments: Read T5-5.

You may want to do the following class activity:



THEN ADD: 3 RED BEADS

FINALLY REMOVE ALL GREEN BEADS

Show the class an empty jar and put in 1 small red bead (or any other available object) and 5 small green beads. Tell the class that suppose you mix the beads in the jar and have a student draw one out without looking. Then ask them, "Suppose the student wins if a red bead is picked. Is it very likely that the student will win?" Add another red bead to the jar and ask how this affects the probability of winning the game. Add 3 more red beads, again having the students tell what they think the probability of winning becomes. Now remove all the green beads and ask how this affects the probability of winning. Also ask, "What is the probability of drawing a green bead from the jar now?"

Assuming that boys and girls are born with equal frequency, discuss the possibilities of a couple planning to have 2 children. Demonstrate that the commonly thought 3 possibilities--boy and girl, 2 girls, and 2 boys--are not equally likely since there are actually 4 possibilities: boy-girl, girl-boy, 2 boys, and 2 girls.

Suggested Assignments: QCR, QTU

QUIZ 1 Anytime after Lesson 3

Lesson 5: The Scale Comparison Model for Division, pp. 235 - 242

Objectives:
1) To recognize when the comparison model for division applies in a situation.
2) To simplify fractions.

Vocabulary: factor, common factor

Comments: Read T5-6 and T5-7.

You may want to read through the lesson as a class. Review the examples carefully.

"SIMPLIFY" INSTEAD OF "REDUCE"

The phrase, "simplifying" fractions, is used instead of "reducing" fractions in this lesson. According to the author, "reducing" a fraction seems to imply that the answer is less than the original fraction (e.g., reduce $\frac{8}{6}$ seems to imply that $\frac{4}{3}$ is less than $\frac{8}{6}$). The students are asked to think of reasons why "simplifying" is used over "reducing" in QD #1.

Be sure to have students explain how they simplified the expressions in QCR #11-12.

READ CAREFULLY

QTU's 1 - 4 show the students the importance of reading a problem carefully before "cranking out" the answer. By simplifying first, unnecessary computation is avoided.

QTU's 5 and 6 point out two common errors in simplification:

$$\frac{6 + x}{3 + x} = \frac{6}{3} = 2 \qquad \text{and} \qquad \frac{x + 5}{y + 5} = \frac{x}{y}$$

Suggested Assignments:

1) QCR
2) QTU

Lesson 6: The Rate Model for Division, pp. 243 - 249

Objective:

1) To recognize when the rate model of division applies in a situation.
2) To divide any two real numbers.
3) To combine division calculations with those of addition, subtraction, and multiplication.

Vocabulary: rate, per

Comments: Read T5-8 and T5-9.

You may want to read through the lesson as a class.

Discuss with the students the difference between ratios and rates in the chapter, and translate this to the difference in the models for division. Although not emphasized in the book, students should be told that "simplify" implies simplification as far as one can.

Suggested Assignments:

1) QCR
2) QTU

QUIZ 2 After first assignment for Lesson 6

Chapter Summary

Comments: Have students read and discuss this section.

Chapter 5 Test

MULTIPLICATION AND DIVISION OF REAL NUMBERS

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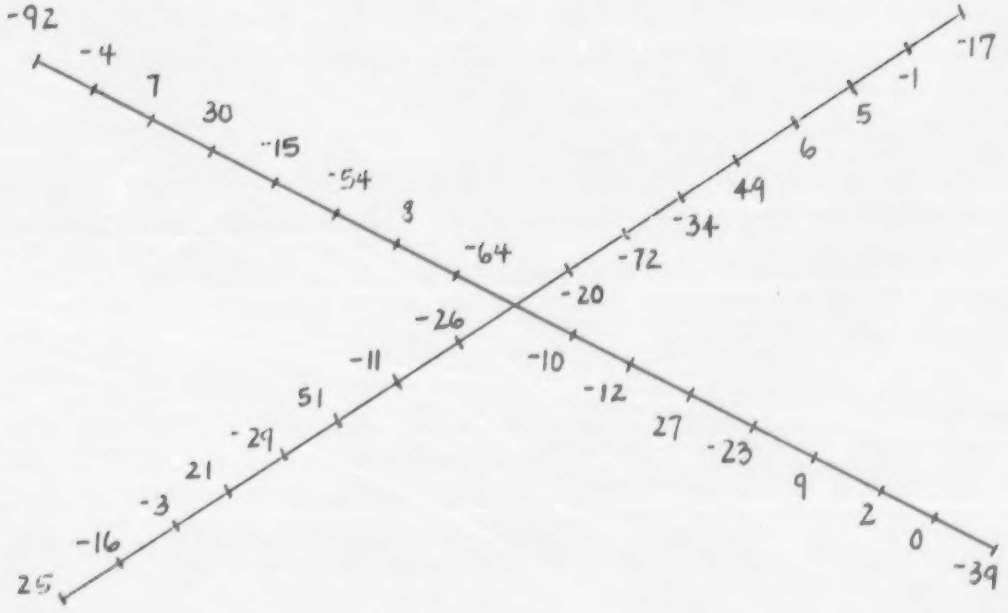

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-1
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6
49
-34
-72
-26
-11
51
-29
21
-3
-16
25

Using the problems on the following page, connect "a" and "b" answers for each problem. (Problems are on the following page.)

W5-9

MULTIPLICATION AND DIVISION OF REAL NUMBERS

		(a)		(b)
1.	(-27)(-1) =	______	(18) ÷ (-6) =	______
2.	(-3)(24) =	______	(88) ÷ (-22) =	______
3.	(-7)(-7) =	______	(-72) ÷ (-8) =	______
4.	(-24)(0.5) =	______	(-35) ÷ (35) =	______
5.	(-16)(4) =	______	(-12.5) ÷ (-0.5) =	______
6.	(-3)(-17) =	______	(-66) ÷ (-33) =	______
7.	(2)(-46) =	______	(-208) ÷ (8) =	______
8.	(0.25)(8) =	______	(238) ÷ (-7) =	______
9.	(-72)(0.75) =	______	(-28) ÷ (-5.6) =	______
10.	(-12.5)(-2.4) =	______	(-261) ÷ (9) =	______
11.	(-0.6)(-35) =	______	(6.9) ÷ (-0.3) =	______
12.	(3400)(-0.01) =	______	(-3.5) ÷ (-0.5) =	______
13.	(1.25)(-16) =	______	(312) ÷ (-8) =	______
14.	(-62.5)(-0.4) =	______	$(-7\frac{1}{2}) \div (\frac{3}{4}) =$	______
15.	(-230)(0.4) =	______	(-150) ÷ (7.5) =	______
16.	$(\frac{2}{3})(-24) =$	______	$(-6\frac{2}{3}) \div (-\frac{5}{6}) =$	______
17.	(-2)(-4)(-2) =	______	(-4.8) ÷ (0.4) =	______
18.	(46)(-0.5) =	______	(-15) ÷ (-2.5) =	______
19.	$(\frac{1}{18})(-72) =$	______	(-132) ÷ (12) =	______
20.	(-14)(-3.5) =	______	(-510) ÷ (-17) =	______
21.	(-3)(3)(-3) =	______	(-43) ÷ (-8.6) =	______
22.	(-1.5)(-34) =	______	(-133) ÷ (-19) =	______
23.	(1.25)(-0.8) =	______	(-104) ÷ (-13) =	______
24.	(-1)(-3)(2) =	______	$(-4\frac{1}{2}) \div (\frac{3}{10}) =$	______
25.	(1.2)(-2.5) =	______	(-16.2) ÷ (0.3) =	______
26.	(0.5)(-12)(-1.5) =	______	$(3\frac{5}{8}) \div (-\frac{1}{8}) =$	______
27.	$(19\frac{1}{2})(-1\frac{1}{3}) =$	______	(-351) ÷ (9) =	______
28.	(-4)(2.75) =	______	(0) ÷ (-61) =	______
29.	(-3)(6)(0)(-5) =	______	$(-18) \div (\frac{1}{4}) =$	______
30.	$(-3\frac{1}{2})(-6) =$	______	(-3.6) ÷ (0.24) =	______
31.	(0.5)(-32)(4) =	______	(204) ÷ (-12) =	______
32.	$(-2\frac{2}{3})(3\frac{3}{4}) =$	______	$(-4\frac{6}{7}) \div (\frac{2}{7}) =$	______

Chapter 5 Name ______________________

Quiz 1 (Lessons 1 - 3) Date ______________________

1. Simplify.

_______ a. $5 \div 0.2$ _______ c. $35 \div 25$

_______ b. $\frac{6}{12}$ _______ d. $\frac{8}{3} \div \frac{4}{9}$

_______ 2. A line segment with length L is split into n pieces of the same length. Each piece has length __?__.

_______ 3. How many $\frac{1"}{4}$ slices of cheese are there in a package of cheese 3" thick? Show how this problem can be considered as a division problem and solve.

_______ 4. A situation has 20 equally likely outcomes. What is the probability of each outcome?

5. Describe a situation where equally likely outcomes occurs.

6. A number n is randomly selected from {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}. Give the probability of each event.

_______ a. n is odd.

_______ b. n is divisible by 5.

Chapter 5 Name ____________________

Quiz 2 (Lessons 5 and 6) Date ____________________

1. Simplify.

________ a. $\frac{2xy}{xyz}$ ________ b. $\frac{^-140a}{20a}$ ________ c. $\frac{3(3a - 1)}{3a - 1}$

2. Multiply. Then simplify.

________ a. $\frac{4x}{^-5} \cdot \frac{5}{4}$ ________ b. $\frac{^-6y}{15} \cdot \frac{5w}{^-3y}$

3. Evaluate each expression when x = 500 and y = 40.

________ a. $\frac{82x}{2x}$

________ b. $\frac{36xy}{12y}$

________4. A car uses 20 gallons of gas traveling 420 miles. How many miles per gallon does the car average?

________5. In x days, if you lost 10 kg, your rate gain per day is __?__.

________6. A letter 0.8 cm high is magnified by a magnifying glass to be 2.4 cm high. How powerful is the glass?

Chapter 5 Test

Name ______________________

Date ______________________

1. Give the reciprocal of each number.

______ a. $-\frac{1}{2}$ ______ b. 1.3

2. Simplify.

______ a. $\frac{pt}{8t}$ ______ c. $\frac{5(m + 1)}{(m + 1)}$

______ b. $\frac{14ab}{7dba}$ ______ d. $\frac{^-100xy}{20y}$

3. Apply the definition of division to simplify.

______ a. $\frac{8}{7} \div \frac{4}{3}$ ______ b. $4 \div \frac{3}{5}$ ______ c. $\frac{1}{2} \div 6$

4. Evaluate each expression when $a = 2$, $b = {}^-5$, and $c = 4$.

______ a. $\frac{b}{3c} \cdot \frac{a}{^-7}$ ______ b. $\frac{^-10c}{100} \cdot \frac{^-10b}{4a}$

5. A coin is tossed 3 times. Find the probability of each event below:

______ a. no heads ______ b. 2 heads ______ c. 1 head

6. A number n is randomly selected from the set $\{^-3, {}^-2, {}^-1, 0, 1, 2, 3\}$. Give the probability of the event:

______ a. n is a fraction.

______ b. n is a rational number.

______ c. $n \cdot n = n$

______ d. n is a prime number.

(Go on to the next page.)

__________ 7. 300 lollipops are to be split up among 75 children. How many lollipops does each child get?

__________ 8. How many $\frac{1''}{4}$ slices of bologna are there in a package of bologna $1\frac{1''}{2}$ thick? Show how this problem can be considered as a division problem and solve.

__________ 9. The scale of a drawing is 1:50. An object with actual length 25 meters will be pictured having what length?

__________ 10. A card is randomly picked from a deck of 52 cards. What is the probability that the card is the king of hearts?

__________ 11. If you go X km and use 50 liters of gasoline, how many kilometers per liter are you getting in your driving?

__________ 12. The height of a man is 182 cm whereas his son's height is 91 cm. How many times taller is the man as compared to his son?

13. Calculate the rate of money earned per hour:

________ a. 20 hours, $70

________ b. 15 hours, $56.25

ANSWER KEY

Multiplication and Division of Real Numbers Worksheets (W5-8 & W5-9)

See separate sheets for answers.

Chapter 5, Quiz 1 *(10 points)*

(4) 1. a. 25 b. $\frac{1}{2}$ c. 1.4 d. 6 *(1)* 2. $\frac{L}{n}$

(1) 3. $3 \div \frac{1}{4} = 12$ Answer: 12 slices of cheese *(1)* 4. $\frac{1}{20}$

(1) 5. Answers will vary. Here are a few possible answers:
   a. You pick a card randomly from a deck of 52 cards.
   b. You toss a coin.
   c. You roll a pair of dice.

(2) 6. a. $\frac{5}{10}$ or $\frac{1}{2}$ b. $\frac{2}{10}$ or $\frac{1}{5}$

Chapter 5, Quiz 2 *(10 points)*

(3) 1. a. $\frac{2}{z}$ b. $^{-}7$ c. 3 *(2)* 2. a. $-x$ b. $\frac{2w}{3}$

(2) 3. a. 41 b. 1500 *(1)* 4. 21 miles per gallon

(1) 5. $\frac{^{-}10 \text{ kg}}{x \text{ days}} = \frac{^{-}10}{x}$ kg/day *(1)* 6. 3 times

Chapter 5 Test *(50 points)*

(2) 1. a. $^{-}2$ b. $\frac{10}{13}$ *(8)* 2. a. $\frac{p}{8}$ b. $\frac{2}{d}$ c. 5 d. $^{-}5x$

(6) 3. a. $\frac{6}{7}$ b. $6\frac{2}{3}$ c. $\frac{1}{12}$ *(4)* 4. a. $\frac{5}{42}$ b. $^{-}2\frac{1}{2}$

(6) 5. a. $\frac{1}{4}$ b. $\frac{1}{4}$ c. $\frac{1}{2}$

(8) 6. a. 0 b. 1 c. $\frac{2}{7}$ d. $\frac{2}{7}$ *(2)* 7. 4 lollipops

(2) 8. $1\frac{1}{2} \div \frac{1}{4}$ Answer: 6 slices *(2)* 9. 0.5 meter *(2)* 10. $\frac{1}{52}$

(2) 11. $\frac{X}{50}$ km per liter *(2)* 12. 2 times taller

(4) 13. a. \$3.50/hour b. \$3.75/hour

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MULTIPLICATION AND DIVISION OF REAL NUMBERS

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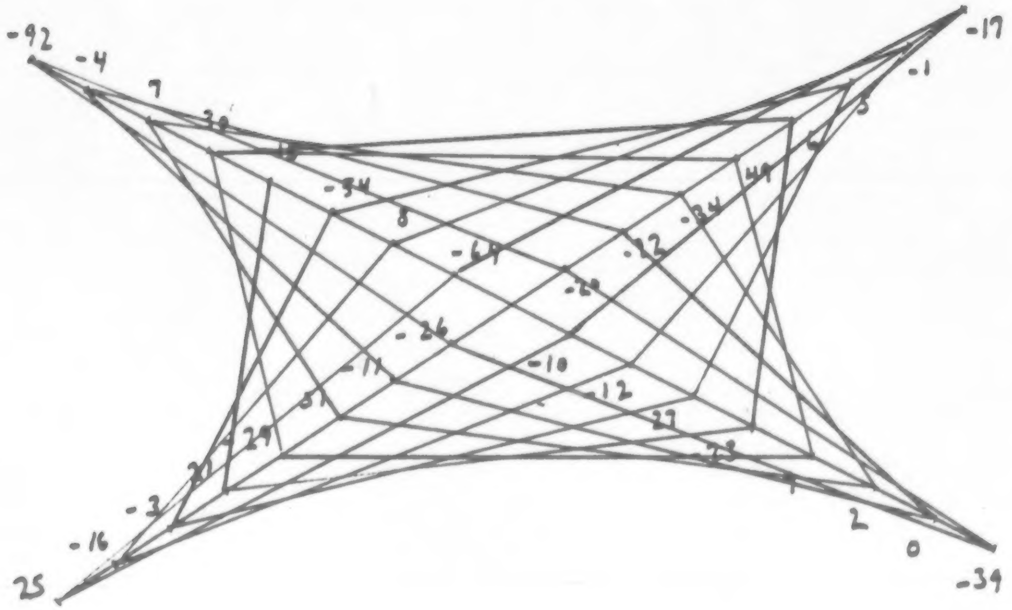
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Using the problems on the following page, connect "a" and "b" answers for each problem. (Problems on following page.)

MULTIPLICATION AND DIVISION OF REAL NUMBERS

		(a)		(b)
1.	(-27)(-1) =	27	(18) ÷ (-6) =	-3
2.	(-3)(24) =	-72	(88) ÷ (-22) =	-4
3.	(-7)(-7) =	49	(-72) ÷ (-8) =	9
4.	(-24)(0.5) =	-12.0	(-35) ÷ (35) =	-1
5.	(-16)(4) =	-64	(-12.5) ÷ (-0.5) =	25
6.	(-3)(-17) =	51	(-66) ÷ (-33) =	2
7.	(2)(-46) =	-92	(-208) ÷ (8) =	-26
8.	(0.25)(8) =	2.00	(238) ÷ (-7) =	-34
9.	(-72)(0.75) =	-54	(-28) ÷ (-5.6) =	5
10.	(-12.5)(-2.4) =	30	(-261) ÷ (9) =	-29
11.	(-0.6)(-35) =	21	(6.9) ÷ (-0.3) =	-23
12.	(3400)(-0.01) =	-34	(-3.5) ÷ (-0.5) =	7
13.	(1.25)(-16) =	-20	(312) ÷ (-8) =	-39
14.	(-62.5)(-0.4) =	25	$(-7\frac{1}{2}) \div (\frac{3}{4}) =$	-10
15.	(-230)(0.4) =	-92	(-150) ÷ (7.5) =	-20
16.	$(\frac{2}{3})(-24) =$	-16	$(-6\frac{2}{3}) \div (-\frac{5}{6}) =$	8
17.	(-2)(-4)(-2) =	-16	(-4.8) ÷ (0.4) =	-12
18.	(46)(-0.5) =	-23	(-15) ÷ (-2.5) =	6
19.	$(\frac{1}{18})(-72) =$	-4	(-132) ÷ (12) =	-11
20.	(-14)(-3.5) =	49	(-510) ÷ (-17) =	30
21.	(-3)(3)(-3) =	27	(-43) ÷ (-8.6) =	5
22.	(-1.5)(-34) =	51	(-133) ÷ (-19) =	7
23.	(1.25)(-0.8) =	-1	(-104) ÷ (-13) =	8
24.	(-1)(-3)(2) =	6	$(-4\frac{1}{2}) \div (\frac{3}{10}) =$	-15
25.	(1.2)(-2.5) =	-3	(-16.2) ÷ (0.3) =	-54
26.	(0.5)(-12)(-1.5) =	9	$(3\frac{5}{8}) \div (-\frac{1}{8}) =$	-29
27.	$(19\frac{1}{2})(-1\frac{1}{3}) =$	-26	(-351) ÷ (9) =	-39
28.	(-4)(2.75) =	-11	(0) ÷ (-61) =	0
29.	(-3)(6)(0)(-5) =	0	$(-18) \div (\frac{1}{4}) =$	-72
30.	$(-3\frac{1}{2})(-6) =$	21	(-3.6) ÷ (0.24) =	-15
31.	(0.5)(-32)(4) =	-64	(204) ÷ (-12) =	-17
32.	$(-2\frac{2}{3})(3\frac{3}{4}) =$	-10	$(-4\frac{6}{7}) \div (\frac{2}{7}) =$	-17

Chapter 6 - Sentence-Solving

Lesson 1: Estimating Wildlife Populations, pp. 257 - 262

Objective: To set up a proportion given a situation involving ratios.

Materials Needed: 100 - 300 small identical items, bag or basket, marker

Vocabulary: estimate, catch-recatch, marking

Comments: Read T6-1 and T6-5.

Run through a marking experiment as suggested on T6-4.

Suggested Assignments:
1) QCR, QTU: #1 - 5
2) QTU: #6,8,9, QD: #1 - 4, one of #5 - 7

Lesson 2: The Multiplication Property of Equations, pp. 262 - 267

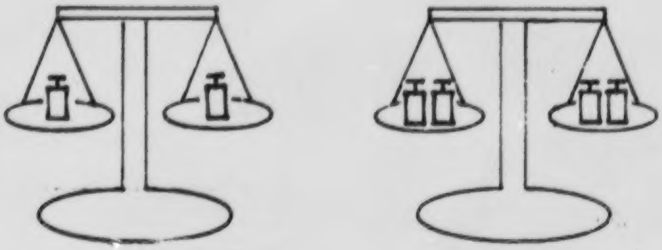
Objective: To use the multiplication property of equations.

Vocabulary: open sentence, solution, solving the sentence, equivalent

Comments: Read T6-7.

BALANCED
SCALE
MODEL

Discuss with students the visualization of this property shown on page 264. Another way of demonstrating this is with equivalent weights and multiples of them. For example, you may want to show students a balanced scale, as shown on the left below. Explain that the scale will remain in balance if the weight on each side is doubled.



The scale will also remain in balance if the weight on each side is multiplied by 3, 4, 1/2, 1/6, and so on.

Tell students that you can think of an equation as a balanced scale. If you multiply both sides of the equation by the same number, then a true sentence results.

M_n

Be sure to point out to the students the abbreviation "M_n," which means "multiply each side by n."

Suggested Assignments: 1) QCR

2) QAR: #1 - 4, 11 - 18

Lesson 3: An Algorithm for Solving ax = b, pp. 267 - 274

Objectives: 1) To solve any equation of the form $ax = b$.

2) To solve for the unknown in formulas with three variables given two of the variables.

Vocabulary: algorithm, unknown, coefficient

Comments: It is recommended that students be given a rationale for the algorithm. For example, you may want to show how an equation could be built.

$$\begin{aligned} x &= 2 \\ (3)x &= (3)2 \\ 3x &= 6 \end{aligned}$$

"UNDO" METHOD

Point out that to solve the equation $3x = 6$ we reverse or "undo" the steps shown.

Solve $3x = 6$

(1) $\frac{3x}{3} = \frac{6}{3}$ *Dividing both sides by 3 (or multiplying by 1/3) undoes the multiplication by 3 on the left side.*

(2) $x = 2$

Be sure to provide students with the opportunity to explain how they solved the equations. Encourage them to use the new terminology.

Suggested Assignments: 1) QCR

2) QAR: #1, 4 - 10

QUIZ 1 Anytime after Lesson 3

Lesson 4: Proportions, pp. 274 - 279

Objectives: 1) To write and solve proportions.

2) To use the means-extremes property to solve proportions.

Vocabulary: proportion, extremes, means

Comments: Read T6-10.

A phrase commonly used instead of "means-extremes property" is "cross-multiply." Students may find it easier to remember as it describes the operation.

Caution students about using the means-extremes property--the property can only be used for solving proportions! Some students make the error of trying to apply the property to multiplying fractions. For example,

$$\frac{2}{3} \cdot \frac{4}{9} = \frac{18}{12} \text{ WRONG!}$$

Be sure to have students discuss QD #1 which shows an example when proportions should not have been used.

Suggested Assignments: 1) QCR

2) QTU: (even numbers), QD

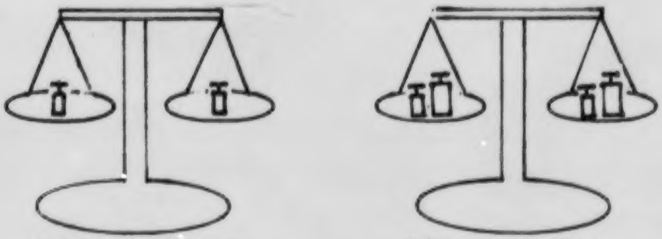
QUIZ 2 Anytime after Lesson 4

Lesson 5: An Algorithm for a + x = b, pp. 280 - 286

Objectives:	1) To solve any equation of the form a + x = b.
	2) To solve formulas.
Vocabulary:	complementary, supplementary
Comments:	Read T6-11 and T6-12.

BALANCED SCALE MODEL

You may want to demonstrate the Addition Property of Equations by using the balanced scale. For example, you may want to show students a balanced scale, as shown on the left below. Explain that the scale will remain in balance if the same weight is added to each side.



Before Addition After Addition

Tell students that you can think of an equation as a balanced scale. If you add the same number to both sides of the equation, then a true sentence results.

Then show students how an equation could be built:

$$x = 5$$
$$x + 3 = 5 + 3$$
$$x + 3 = 8$$

To solve the equation $x + 3 = 8$ we reverse or "undo" the steps shown.

Solve $x + 3 = 8$

$x + 3 + {}^{-}3 = 8 + {}^{-}3$ A-3

$x = 5$

Adding ¯3 to both sides (or subtracting 3) undoes the addition by 3 on the left side.

Have students place their solutions on the blackboard and have them explain the steps they took to solve the equations.

For problems like "$89 = 97 + x$" you may want to ask questions such as:

PROBLEM SOLVING

What is the problem?
What does the "x" stand for?
What is the first step?
Why do you add ¯97 to both sides of the equation?
What is the answer?
Does your answer seem reasonable?
Does your answer check?

Suggested Assignments:
1) QCR

2) QTU

Chapter 6 Test, Part I

Lesson 6: Inequalities, pp. 286 - 291

Objectives:
1) To apply the models for addition and multiplication to set up sentences of the form $ax < b$.

2) To review graphing of inequalities.

3) To write the solution set for inequalities.

Vocabulary: inequality, solution set

Symbols: {n: }

Comments: Read T6-13.

Students should be given practice in reading and writing the sentences like "$4n \leq 20$" and solution sets like "$\{n: n > 2\}$."

Suggested Assignments:
1) QCR
2) QAR

Lesson 7: Inequalities and Addition, pp. 291 - 294

Objective: To solve any inequality of the form $a + x < b$ (the objective includes $a + x \leq b$, $a + x > b$, $a + x \geq b$, etc.).

Comments: Read T6-14 and T6-15.

Assign only the reading of pages 291 and 292 (up until Example 3) and the "Questions on solving inequalities."

Have students practice reading and writing sentences like "$x + 14.2 < 20$." They should also explain to the rest of the class how they solved the inequalities and why. Students should be reminded to check their answers for reasonableness.

Suggested Assignments: QSI: #1 - 22

Lesson 8: Inequalities and Multiplication, pp. 297 - 302

Objective: To solve any inequality of the form $ax < b$.

Comments: Read T6-16 and T6-17.

You may want to review more examples which illustrate the Multiplication Properties of Inequalities. Caution students about multiplying both sides of an inequality by a negative number.

CHECK WORK

It is very important that the students check their work. Have them follow the two steps described on pages 299 and 300.

Suggested Assignments: QCR

Lesson 9: More Problems to Solve (OMIT)

Chapter Summary

Comments: Have students read and then discuss the summary as a class.

Chapter 6 Test, Part II

Chapter 6 Name ____________________

Quiz 1 (Lesson 1 - 3) Date ____________________

1. You wish to estimate p, the total number of peanuts in a can of mixed nuts. You pick out 10 peanuts, mark them and return them into the can. After shaking the can, you pick out 25 peanuts and 5 are marked.

________ a. Give an equation which could be solved to estimate p.

________ b. About how many peanuts are in a can of mixed nuts?

2. Apply the given action to the sentence.

________ a. $xy = xz \quad M_{\frac{1}{x}}$ ________ b. $3c = 9 \quad M_{-3}$

3. The multiplication property of equations has been applied to get from sentence (i) to sentence (ii). By what has each side of (i) been multiplied?

________ a. (i) $4z = 0.036$ (ii) $z = 0.009$

________ b. (i) $^{-}8 = 0.2c$ (ii) $^{-}40 = c$

4. Solve for the unknown. Check your answers by substituting in the original equation.

________ a. $\frac{m}{7} = \frac{2}{21}$ ________ b. $15x = {}^{-}13.5$

________ 5. The formula, $I = prt$, relates simple interest I, principle (how much is invested) p, rate r, and time t. How long would it take to earn \$1500 if you invested \$5000 at 6%?

Chapter 6

Quiz 2 (Lesson 4)

Name______________________

Date______________________

1. In each proportion, suppose you want to get rid of the fractions. Multiplying both sides by what number will do this?

__________ a. $\frac{x}{8} = \frac{5}{6}$

__________ b. $\frac{3}{8} = \frac{9}{y}$

2. Solve using the Means-Extremes Property.

__________ a. $\frac{-6}{x} = \frac{3}{4}$

__________ b. $\frac{-140}{3} = \frac{y}{10}$

3. For each of the following questions:

1) Write the proportion that will answer the question.
2) Solve the proportion.

__________ a. A car travels 200 km on 14 liters of gas. How many liters will it use to go 30 km?

__________ b. Twelve cans of soup cost $4.00. How much will 5 cans cost?

__________ c. A man 175 cm tall casts a shadow 70 cm long. The shadow of his son is 30 cm long. How tall is his son?

Chapter 6 Test, Part I

Name ____________________

Date ____________________

1. Apply the given operations to both sides of the equation.

________ a. $^-2 + n = 20 \quad A_2$

________ b. $\frac{t}{4} = {}^-6 \quad M_4$

________ c. $4x = 136 \quad M_{\frac{1}{4}}$

________ d. $x + 9 = 57 \quad A_{-9}$

2. Solve each equation and check your answer.

________ a. $x + 50 = 74$

________ b. $g - {}^-7 = 81$

________ c. $\frac{13}{8} = y + \frac{5}{8}$

________ d. $\frac{1}{20} = \frac{x}{8}$

________ e. $14a = -84$

________ f. $1 + c = -1$

3. Write an equation that can be used to solve each problem below. Then solve the equation.

________ a. A car travels 185 miles on 8 gallons of gas. How many miles can it travel on 12 gallons of gas?

________ b. The ratio of female students to male students at a certain college is 10 : 14. There are 525 female students. How many male students are there?

________ c. Find the length of the third side of a triangle if two sides have length 25 cm and 48 cm and the perimeter is 100 cm.

(Go on to the next page.)

________ d. The formula d = rt relates the distance traveled d, rate or speed r, and time t. A car travels 400 miles in 8 hours. About what speed was it traveling?

________ e. There are about 36 calories in 16 ounces of yogurt. About how many calories are in a 5-ounce serving of yogurt?

________ f. Jon earned $169.12 last week. How much did he earn this week if his total earnings for the two weeks was $321.47?

4. The formula, I = prt, relates simple interest I, principle (how much is invested) p, rate r, and time t.

________ a. If you invest $1000 for 4 years, what rate do you need in order to earn $200 interest?

________ b. How long would it take to earn $3500 if you invested $10,000 at 7%?

______ 5. The multiplication property of equations has been applied to sentence *(ii)* from sentence *(i)*. By what number has each side of sentence *(i)* been multiplied?

(i) $\frac{x}{9} = 12$ *(ii)* $x = 108$

______ 6. Solve for w: $A = \ell w$

______ 7. Together Mike and Judy have $75. If Judy has x dollars, how much does Mike have?

Chapter 6 Test, Part II

Name ____________________

Date ____________________

1. Describe each situation by means of an inequality.

__________ a. There were over 42,000 people at the football game. (Let P be the number of people at the game.)

__________ b. Kevin wants to buy 8 gifts and spend less than $60. (Let C be the cost he can spend per gift.)

__________ c. The boxes are about 4 to 10 pounds in weight. (Let W be the weight of a box.)

2. Apply the given operations to each sentence.

__________ a. $x - 5 \geq 8$ A_5

__________ c. $10 > {}^{-}10m$ $M_{\frac{-1}{10}}$

__________ b. $\frac{a}{9} < \frac{2}{3}$ M_9

__________ d. $x - \frac{1}{4} \leq 9$ $A_{\frac{1}{4}}$

3. Solve each inequality and check your answer.

__________ a. $\frac{x}{6} < {}^{-}2$

__________ c. $m - 1.5 \leq 3.7$

__________ b. $6 \geq 8 + k$

__________ d. $15n < \frac{3}{8}$

4. Solve each inequality and graph the solutions.

a. $y - 25 \geq 5$

b. $3x < {}^{-}9$

5. For each question below:

   1) Write an inequality that will help to answer the question.
   2) Solve the inequality.
   3) Answer the question.

   a. You have \$35 to buy tickets for a show. If tickets are \$5 each, how many can you buy? (Give all possible solutions.)

      1) ________ 2) ________ 3) ________

   b. A person owes \$150. How much must the person save to pay off the debt and have at least \$300 in savings?

      1) ________ 2) ________ 3) ________

   c. Suppose notebooks cost 89¢ each. If you have less than \$9, what are the possible number of notebooks you can buy?

      1) ________ 2) ________ 3) ________

   d. A number increased by 5 is less than 37. What could the number be? (Give all possible solutions.)

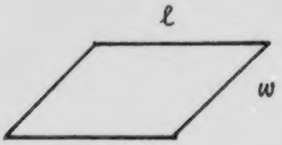
      1) ________ 2) ________ 3) ________

   e. A number divided by 4 is greater than 9. What could the number be? (Give all possible solutions.)

      1) ________ 2) ________ 3) ________

________ 6. Solve for x: $y < x - 1$

________ 7. If A is the area of the parallelogram shown, then $A \le \ell w$. What are the possible values of ℓ if $w = 10$ and $A = 50$?



________ 8. Solve for x: $-x > 5$

ANSWER KEY

Chapter 6, Quiz 1 *(10 points)*

(1) 1. a. $\frac{5}{25} = \frac{10}{p}$ b. about 50 peanuts

(4) 2. a. $y = z$ b. ${}^-9c = {}^-27$ 3. a. $M_{1/3}$ b. M_5

(4) 4. a. $m = \frac{2}{3}$ b. $x = {}^-0.9$ *(1)* 5. 5 years

Chapter 6, Quiz 2 *(10 points)*

(2) 1. a. multiplying by 48 b. multiplying by 8y

(2) 2. a. $x = {}^-8$ b. ${}^-466.\overline{6}$

(6) 3. a. $\frac{200}{14} = \frac{30}{x}$, $x = 2.1$
You would use 2.1 liters of gas.

b. $\frac{12}{4.00} = \frac{5}{x}$, $x = 1.\overline{6}$
5 cans will cost about $1.67.

c. $\frac{175}{70} = \frac{y}{30}$, $y = 75$
The son is 75 cm tall.

Chapter 6 Test, Part I *(50 points)*

(8) 1. a. $n = 22$ b. $t = {}^-24$ c. $x = 34$ d. $x = 48$

(12) 2. a. $x = 24$ b. $g = 74$ c. $y = 1$ d. $x = \frac{8}{20} = \frac{2}{5}$

e. $a = {}^-6$ f. $c = {}^-2$

(18) 3. a. $\frac{185}{8} = \frac{x}{12}$ Answer: 277.5 miles

b. $\frac{10}{14} = \frac{525}{x}$ Answer: 735 male students

c. $25 + 48 + x = 100$ Answer: 27 cm

d. $400 = 8r$ Answer: 50 miles per hour

e. $\frac{36}{16} = \frac{x}{5}$ Answer: 11.25 calories

f. $169.12 + x = $321.47 Answer: $152.35

(6) 4. a. 5% b. 5 years *(2)* 5. multiplied by 9

(Go on to the next page.)

Chapter 6 Answer Key - Page 2

(4) 6. $w = \frac{A}{\ell}$ 7. $(75 - x)$ dollars

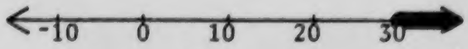
Chapter 6 Test, Part II *(50 points)*

(6) 1. a. $P > 42{,}000$ b. $8C < 60$ c. $4 \leq W \leq 10$

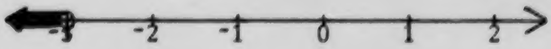
(8) 2. a. $x \geq 13$ b. $a < 6$ c. ${}^-1 < m$ d. $x \leq 9\frac{1}{4}$

(8) 3. a. $x < {}^-12$ b. $k \leq {}^-2$ c. $m \leq 5.2$ d. $n < \frac{1}{40}$

(6) 4. a. $y \geq 30$



b. $x < {}^-3$



(15) 5. a. 1) $5x \leq 35$ 2) $x \leq 7$ 3) 7 or less tickets

b. 1) ${}^-150 + x \geq 300$ 2) $x \geq 450$ 3) at least \$450

c. 1) $0.89x < 9$ 2) $x < 10.1$ 3) 10 or less notebooks

d. 1) $x + 5 < 37$ 2) $x < 32$ 3) any number less than 32

e. 1) $\frac{x}{4} > 9$ 2) $x > 36$ 3) any number greater than 36

(2) 6. $x > y + 1$ *(3)* 7. ℓ can be any number greater than or equal to 5.

(2) 8. $x < {}^-5$

Chapter 7 - Linear Expressions and Distributivity, Part I

Lesson 1: Situations Leading to Linear Expressions, pp. 309 - 314

Objectives:
1) To recognize and name linear expressions.
2) To translate a situation involving constant gain or loss (e.g., weights of fruit crates or envelopes, populations, movements of storms) into mathematical expressions.
3) To read and make charts, and find patterns in them.

Vocabulary: linear expressions

Comments: Read T7-1 through T7-4.

Read through the lesson with the students as suggested on page T7-4. Students should be able to give examples of linear expressions as well as give examples of expressions which are not linear.

READ CHARTS

Be sure to discuss the charts in examples 1 and 2 as a class. You may want to ask questions like the following for the first chart:

- -- What do the numbers in the first column represent?
- -- What does the expression "$6 + 2 \cdot .2$" represent?
- -- Do you see any patterns?
- -- What will the weight of the crate be for 5 oranges? 6 oranges? 10 oranges? n oranges?

Similar questions may be asked for the second chart.

Have students explain how they constructed their charts in the exercises.

Suggested Assignments: QCR (in class), QER

Lesson 2: Situations Leading to $ax + b = c$ or $ax + b < c$, pp. 314 - 319

Objective: To translate a situation involving gain or loss into mathematical sentences.

Vocabulary: linear sentence

Materials Needed: Worksheet 1

Comments: Read T7-6.

READING GUIDE

Have students answers the questions on Worksheet 1 as they read the lesson.

It is very important to have students explain how they arrived at the sentences to solve the questions. Be sure to discuss key words such as "under," "over," "at least," "no more than," and so on.

Suggested Assignments:
1) Worksheet 1 - Reading Guide, QCR: #1 - 8
2) QCR: #9 - 12, QAR

QUIZ 1 Anytime after Lesson 2

Lesson 3: An Algorithm for Solving ax + b = c, pp. 319 - 325

Objectives:
1) To solve any equation of the form $ax + b = c$.
2) Given a verbal problem, writes an appropriate equation, solves the equation, interprets the problem in terms of the problem setting.

Comments: Read T7-7.

Students should be given a rationale for the algorithm. You may want to show the students how an equation of the form $ax + b = c$ could be built:

$$\begin{aligned} x &= 3 \\ 2x &= 3(2) \\ 2x &= 6 \\ 2x + 4 &= 6 + 4 \\ 2x + 4 &= 10 \end{aligned}$$

THE "UNDO" METHOD

Point out that to solve the equation $2x + 4 = 10$ we reverse or "undo" the steps shown.

$$2x + 4 = 10$$

$$2x = 6 \qquad A_{-4}$$

(adding $^-4$ to both sides undoes the addition of 4 on the left side)

$$x = 3 \qquad M_{\frac{1}{2}}$$

(multiplying both sides by $\frac{1}{2}$ undoes the multiplying by 2 on the left side)

EXAMPLES IN EVERYDAY LIFE

You may want to discuss with the students examples of undoing things in everyday life. For example, you put on a pair of socks, then your shoes, and then tie your shoelaces. To "undo" this, you untie your shoelaces, remove the shoes, and then you remove the socks. Similarly, in solving equations, you would undo the last operation you performed to build it.

COMMON ERRORS

Caution students about solving equations like $150 - 20h = 200$. Some students make the error of adding 20 or 150 to both sides of the equation instead of adding $^-150$! Another common error is to subtract 150, but record $20h = 50$ instead of $^-20h = 50$.

Have students present and explain their solutions to the equations.

Suggested Assignments:

1) QCR: #1 - 20, QD #1
2) QCR: #21 - 32, QAR: #1 - 8
3) QAR: #13 - 22

Lesson 4: An Algorithm for Solving $ax + b < c$, pp. 326 - 330

Objectives:

1) To solve a sentence of the form $ax + b < c$.
2) Given a verbal problem, writes an appropriate inequality, solves the inequality, interprets the problem in terms of the problem setting.

Materials Needed: Worksheet 2

Comments: Read T7-9.

READING

Have students answer the reading guide questions on Worksheet 2 as they read the lesson.

Have students present and explain their solutions to the inequalities.

PROBLEM SOLVING

For problems like QCR #21, encourage students to use the four steps to problem solving. They should ask themselves questions such as:

-- What is the problem about?
-- What information is given?
-- What are you to find?
-- What inequality will help answer the question?
-- What is the answer?
-- Does the answer check?

CHECK SOLUTIONS

It is very important for students to check their solutions. The two-step check described on pages 299 and 300 is recommended.

Suggested Assignments:

1) Worksheet 2--Reading Guide, QCR
2) QTU

QUIZ 2

Anytime after first assignment for Lesson 4

Lesson 5: The Distributive Property, pp. 330 - 336

Objectives:
1) To apply the distributive property to simplify expressions of the form ac + bc.
2) To use the distributive property to help solve linear sentences.

Vocabulary: distributive property of multiplication over addition

Comments: Read T7-10.

EXPLAIN ANSWERS

Students should be able to explain how they simplified the expressions and how they solved the equations and inequalities.

Remind students to check their work in simplifying expressions by selecting a value for the variable and substituting it for the variable.

Students should realize that each term in an expression must have a common factor in order to simplify it. For example "2x + 5x" can be simplified while "2x + 3" cannot be.

Suggested Assignments:
1) QCR: #1 - 13 (odd numbers), #14 - 31
2) QCR: #32 - 39, QTU

Lesson 6: The Distributive Property and Subtraction, pp. 337 - 341

Objectives:
1) To apply the distributive property to simplify expressions of the form ac - bc.
2) To use the distributive property to help solve linear sentences.

Vocabulary: distributive property of multiplication over subtraction

Comments: Read T7-11 and T7-12.

Be sure to discuss with the students the suggestion made in example 2 on page 338 to convert multiple subtractions to sums of negative numbers (e.g., $2A - 8A - 5B - 6B = 2A + {}^{-}8A + {}^{-}5B + {}^{-}6B$) in order to reduce the making of errors. Also, discuss why answers like "$6a - 2b$" and "$8x + 3y$" are preferred to "$6a + {}^{-}2b$" and "$8x - {}^{-}3y$," respectively.

Have students explain the steps they took to simplify the expressions in QCR #5 - 16.

Suggested Assignments:
1) QCR
2) QTU

Chapter Summary

Comments: Review as a class.

Chapter 7 Test

Chapter 7, Lesson 2
Worksheet 1--Reading Guide

Name____________________

Date____________________

Read situation 1 on page 314. Then answer question 1.

1. Look at the expression, "6 + .2n."

__________ a. What does the "6" stand for?

__________ b. What does the "n" stand for?

__________ c. What does the ".2n" stand for?

__________ d. What does the "6 + .2n" represent?

Read Questions 1 and 2 on page 315. What sentence could be solved to answer each question below?

_______ 2. Suppose the crate could weigh at least 40 kg to be economical. How many oranges can it hold?

_______ 3. Suppose the crate could weigh 60 kg without breaking. How many oranges can it hold?

_______ 4. Suppose the crate could weigh at the most 70 kg. How many oranges can it hold?

Read situation 2 on page 315. Then answer question 5 below:

5. Look at the expression, "150 - 20h."

__________ a. What does the "h" stand for?

__________ b. What does the "20h" stand for?

__________ c. What does the "150 - 20h" stand for?

(Go on to the next page.)

Read Questions 1 and 2 on the top of the page 316.
What sentence could be solved to answer each question below?

__________ 6. When were the storms 100 miles west of Chicago?

__________ 7. When were the storms 50 miles west of Chicago?

Read situation 3 on page 316 and then answer question 8 below.

8. Look at the expression, "80h + 200 + 14f."

______________ a. What does the "80h" stand for?

______________ b. What does the "200" stand for?

______________ c. What does the "14f" stand for?

Now read Questions 1 through 3 on pages 316 - 317. What sentence could be solved to answer each question below?

__________ 9. Suppose you order a 2 oz. hamburger. How may french fries can you eat in order to have a lunch with less than 420 calories?

__________ 10. If you eat 20 french fries, how big a hamburger can you order to get an 800-calorie lunch?

Chapter 7, Lesson 4
Worksheet 2--Reading Guide

Name __________________________

Date __________________________

Read pages 326 and 327 in your textbook, then answer the following questions.

1. What is Algorithm 4?

2. Look at the solution to the inequality, "$6 + .2n \geq 45$."

__________ a. How was the inequality, "$.2n \geq 39$," obtained for the first step?

__________ b. What was done in the second step?

__________ 3. What is the answer to example 1?

4. Look at the solution to the inequality, "$320 + 14f < 600$."

__________ a. When $^-320$ was added to both sides of the inequality, what inequality was obtained?

__________ b. How was the inequality, "$f < 20$," obtained from "$14f < 280$"?

__________ 5. What is the answer to example 2?

6. Look at the solution to the inequality, "$11 < 2 - \frac{1}{3}t$."

__________ a. How was the first step obtained?

__________ b. How was the inequality, "$^-27 > t$," obtained from "$9 < -\frac{1}{3}t$"?

Chapter 7 Name ______________________________

Quiz 1 (Lessons 1 - 2) Date ______________________________

1. You decide to save money. You start with $20 and add $5 each week.

   a. Complete the chart on the right showing how much you will have after 0, 1, 2, 3, 4, 5, ... weeks.

Weeks from now	Savings
0	
1	
2	
3	
4	
5	

______________ b. How much will you have saved after x weeks?

c. What sentence could be solved to answer each question?

______________ 1) How many weeks will it take you to save $200?

______________ 2) How many weeks will it take you to save over $500?

______________ 2. How much would it cost you to buy x candy bars at 15¢ a piece and y packages of potato chips at 35¢ a piece?

______________ 3. Give an example of a linear expression.

______________ 4. Mark has $85. Aloha shirts are on sale for $18 each. What sentence could be solved to answer this question: How many shirts can he buy and still have at least $10 left?

Chapter 7

Quiz 2 (Lessons 3 - 4)

Name ____________________________

Date ____________________________

1. Solve the following sentences and check your solutions.

   a. $2n + 90 = 236$

   b. $4 - 5x \le 19$

2. Give an equation or inequality which can be solved to answer the question; solve the equation or inequality; then answer the question.

   a. T-shirts sell for $9 each and tank-tops sell for $7 each. Carrie has $40. If she buys 1 tank-top, how many t-shirts can she buy?

   b. A crate weighs 10 kg when empty. A cantaloupe weighs about 0.8 kg a piece. How many cantaloupes can be put in the crate so that the total weight is over 50 kg?

   c. Janet puts $500 down and pays $175 a month for a car. In how many months will she have paid $4000 total?

Chapter 7 Test

Name ______________________

Date ______________________

Simplify.

_______ 1. $7t + 5t + {}^-10t$

_______ 2. $5.3m - 7 + 3.7m + 8$

_______ 3. $11w - 11w + 8$

_______ 4. $9y + 5 - 4y - 3$

_______ 5. $8m + 9n + {}^-2m + 4n$

_______ 6. $12x - 3x + 6x$

Solve the following sentences and check your solutions.

_______ 7. $5x - 12 = 18$

_______ 8. $6 + 7H > {}^-43$

_______ 9. ${}^-26a + 15 + 40a = 43$

_______ 10. $26 \leq 3x + 2x - 9$

_______ 11. $15 - 8w = 39$

_______ 12. $9b - 2b \geq 14$

(Go on to the next page.)

For each of the following problems:

a) Write a sentence which can be solved to answer the question.
b) Solve the sentence.
c) Answer the question.

13. Popcorn sells for 50¢ a bag and small drinks for 35¢ each. Suppose Mr. Chun buys 6 drinks. How many bags of popcorn can he buy if he has only $5?

a) ________ b) ________ c) ________

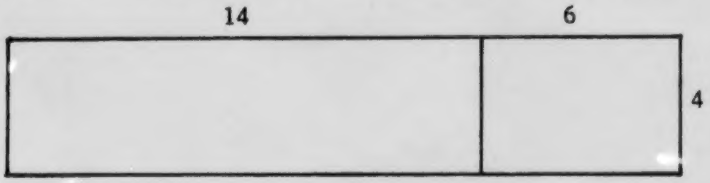
14. A piece of toast has about 70 calories, 1 scrambled egg has about 100 calories, and a cup of orange juice has about 100 calories. Suppose you have 2 pieces of toast and 1 scrambled egg. How many cups of orange juice can you drink and still have a meal of less than 500 calories?

a) ________ b) ________ c) ________

15. An envelope weighs about 5 grams. A sheet of letter paper weighs about 3 grams. How many sheets of paper could you put in the envelope so that it weighs 20 grams?

a) ________ b) ________ c) ________

________ 16. Dimensions of the rectangles are given. What is the total area?



17. Keith now weighs 165 pounds. He wants to lose about 2.5 pounds per week.

a. Make a chart to show how much he would weigh after 0, 1, 2, 3, 4, 5, ... weeks.

________ b. How much would he weigh after n weeks?

ANSWER KEY

Chapter 7, Quiz 1 *(10 points)*

(2) 1. a.

Weeks From Now	Savings
0	20
1	$20 + 5$
2	$20 + 2 \cdot 5$
3	$20 + 3 \cdot 5$
4	$20 + 4 \cdot 5$
5	$20 + 5 \cdot 5$

(1) b. $\$(20 + 5x)$

(2) c. 1) $20 + 5x = 200$

2) $20 + 5x > 500$

(2) 2. $(15x + 35y)$ cents

(1) 3. Answers may vary. Here are some examples: $5x + 2$, $8(3 - 2y)$, $9k$, and $7y - 8w$

(2) 4. $85 - 18x \geq 10$

Chapter 7, Quiz 2 *(10 points)*

(4) 1. a. $n = 73$ b. $x \geq {}^-3$

(6) 2. a. $7 + 9x \leq 40$
Solution: $x \leq 3\frac{2}{3}$
Answer: 3 t-shirts or less

b. $10 + 0.8x > 50$
Solution: $x > 50$
Answer: 51 or more canteloupes

c. $500 + 175x = 4000$
Solution: $x = 20$
Answer: 20 months

Chapter 7 Test *(50 points)*

(12) 1. $2t$ 2. $9m + 1$ 3. 8 4. $5y + 2$ 5. $6m + 13n$ 6. $15x$

(3) 7. $x = 6$ 8. $H > {}^-7$ 9. $a = 2$

(9) 10. $x \geq 7$ 11. $w = {}^-3$ 12. $b \geq 2$

(4) 13. a) $210 + 50x \leq 500$ b) $x \leq 5\frac{4}{5}$ c) 5 or less bags of popcorn

(4) 14. a) $140 + 100 + 100x < 500$ b) $x < 2.6$ c) 1 or 2 cups of orange juice

(4) 15. a) $5 + 3x = 20$ b) $x = 5$ c) 5 sheets of paper

(3) 16. 80

(5) 17. a.

Weeks From Now	Weight (lb.)
0	165
1	162.5
2	160
3	157.5
4	155
5	152.5

b. $(165 - 2.5n)$ pounds

Chapter 8 - Linear Expressions and Distributivity, Part II

Lesson 1: Models, Postulates, and Theorems, pp. 343 - 347

Objectives:
1) To define the following terms: models, postulate, theorem.
2) To identify the postulate being used given a use of a postulate of addition or multiplication of real numbers.

Vocabulary: postulates, theorems

Comments: Read T8-1 through T8-4.

Students should already be familiar with all the postulates, except for the closure properties. Be sure to discuss the importance of these properties.

You may want to have students do problems like QTU #1 - 10 orally. Practice with these types of problems will help them learn the postulates.

Suggested Assignments:
1) QCR
2) QTU, QD

Lesson 2: Distributivity and the Multiplicative Identity Property, pp. 348 - 352

Objectives:
1) To simplify expressions of the form x - ax and x + ax.
2) To write an algebraic expression for a percentage increase or decrease of a given quantity.

Comments: Read T8-5 and T8-6.

You may want to read through the lesson with the students. Discuss each example with them carefully and ask questions frequently to check the students' understanding of the solution. Questions like the following may be asked as example 1 is discussed:

QUESTIONS TO CHECK FOR UNDERSTANDING

1) What is the problem about?
2) What information is given?
3) What are we to find?
4) How was the expression "p + .20p" obtained for the new price?
5) Look at the steps shown for simplifying the expression, "p + 0.20p":
    a) How was the first step obtained?
    b) What property allowed for the second step?
    c) How was the third step obtained?
6) What is the answer to the question?
7) Does the answer seem reasonable?
8) Suppose an item was $30. If the price is raised 20%, what is the new price? Is the new price 1.20 times the old price?

Similar questions may be asked for the other examples.

The multiplicative identity property is very important. Students should realize that $a = 1 \cdot a$ and NOT $a = 0 \cdot a$!

CALCULATORS RECOMMENDED

Calculators are recommended for most of the QAR. If the students do not have access to their own calculators, you may want to assign only part of the instructions for QAR #1 - 4 and 7 for homework. Part b for these questions could be done in class the next day.

Suggested Assignments:
1) QCR
2) QAR: #1 - 8

QUIZ 1

Anytime after Lesson 2

Lesson 3: Zero, Multiplication, and Division, pp. 352 - 358

Objective: To solve sentences of the form $0x \leq a$.

Comments: Read T8-7.

HELP WITH THE READING

The reading of this lesson may be difficult for some students. Remind them about the use of underlining and "boxes" in the text to emphasize important concepts. For example, the Zero Multiple Theorem is underlined and shown in a "box" on page 353.

Be sure to point out the importance of reading a lesson more than once!

Suggested Assignments:
1) QCR
2) QTU

Lesson 4: Distributivity and Commutativity, pp. 358 - 364

Objective: To apply the distributive property to simplify expressions of the form $a(x + y)$.

Comments: Read T8-8 and T8-9.

For QCR #1 - 4, students are asked to give two expressions which answer each question. These exercises emphasize the properties discussed in the lesson.

Be sure to stress that to find the opposite of a sum, find the opposite of each term. Here is a common error:

$$\cancel{6 - (u + v) = 6 - u + v} \qquad \text{WRONG!}$$

Caution students about simplifying expressions like 8 - 2(5 - 2p). You may want to review a few examples of this type as a class.

A supplementary worksheet with more exercises on simplifying expressions and on solving equations and inequalities is provided.

Suggested Assignments:
1) QCR: #1 - 22
2) QCR: #23 - 40 and Supplementary Worksheet 1
3) QTU

QUIZ 2 Anytime after Lesson 4

Lesson 5: Distributivity, Division, and Fractions, pp. 364 - 368

Objective: To apply the distributive property to simplify expressions of the form (x + y)/a when appropriate.

Comments: Read T8-10.

Caution students about simplifying expressions like example 2 on page 365. A common error is to add the opposite of "3" as below:

$$\frac{y}{2} - \frac{3 + y}{2} = \frac{y - (3 + y)}{2}$$

$$= \frac{y - 3 + y}{2} \left.\vphantom{\frac{y}{2}}\right\} \textit{WRONG!}$$

Suggested Assignments:
1) QCR
2) QTU

Lesson 6: Decision Making Using Sentences, pp. 368 - 372

Objective: To translate situations involving linear expressions into sentences of the form $ax + b \leq cx + d$.

Comments: Read T8-11 and T8-12.

Remind students to read the examples in the lesson carefully. As they read the examples they should be asking themselves the following questions:

PROBLEM SOLVING

1) What is the problem about?
2) What information is given?
3) What are you to find?
4) What equation or inequality can be written to answer the question?

Suggested Assignments:
1) QCR
2) QTU

Lesson 7: Solving $ax + b < cx + d$, pp. 373 - 377

Objectives:
1) To solve sentences of the form $ax + b \leq cx + d$.
2) Given a verbal problem, writes an appropriate equation or inequality, solves the equation or inequality, and interprets the problem in terms of the problem setting.

Comments: Read T8-12 and T8-13.

Read through the lesson with the students. As you discuss the solution to the equation on page 373, $50x + 120 = 30x - 200$, ask students why they think $^{-}30x$ is added to both sides of the equation. Get them to see that the result, $20x + 120 = {}^{-}200$, is a kind of equation that they know how to solve. Similarly, discuss the solutions to the two inequality examples. Be sure to have students go back to check the answers.

You may want to discuss the solutions to these sentences as a class too:

1) $5y + 8 - 2y = 17 - 6y$
2) $4(x + 2) = 8(x + 5)$

Write the steps for their solutions on the blackboard as the students tell you what to do. Be sure to discuss what is being done at each step and to check the final answer.

A supplementary worksheet with more exercises like QCR #1 - 12 is provided.

Suggested Assignments:
1) QCR: #1 - 12
2) QCR: #13 - 20, Supplementary Worksheet 2
3) QTU

QUIZ 3 Anytime after Lesson 7

Lesson 8: Situations Which Always or Never Happen, pp. 377 - 381

Objectives:
1) To solve sentences which are always or never true.
2) Given a verbal problem, writes an appropriate equation or inequality, solves the equation or inequality, and interprets the problem in terms of the problem setting.

Comments: Read T8-14.

The example on the populations of two cities presents a situation when zero is a solution. Be sure to stress that this is different from having no solution at all.

A supplementary worksheet with problems like those in Lessons 7 and 8 is provided.

Suggested Assignments:
1) QCR, QTU
2) Supplementary Worksheet 3

Chapter Summary

Comments: Have students read and discuss the summary.

Chapter 8 Test

Chapter 8, Lesson 4
Supplementary Worksheet 1

Name ______________________________

Date ______________________________

Find an equal expression which has no parentheses.

__________ 1. $^{-}7(x + 9)$

__________ 2. $^{-}10(2 - w)$

__________ 3. $-(9k - 6)$

__________ 4. $3 - 2(a + 4)$

__________ 5. $7 - (x - r)$

__________ 6. $h(^{-}5 - k)$

__________ 7. $^{-}8 - (j - 4)$

__________ 8. $9 - 3(t - 4)$

Solve each of the following sentences:

__________ 9. $3(2 + x) \geq {}^{-}12$

__________ 10. $6 - (m - 1) = 9$

__________ 11. $8 - 3(v - 3) < 5$

__________ 12. $-(2k - 15) = 45$

__________ 13. $3 + 4(2 + 5y) \leq 11$

__________ 14. $12 - (4x + 2) = {}^{-}6$

Chapter 8, Lesson 7
Supplementary Worksheet 2

Name ____________________

Date ____________________

For problems 1 - 4, you are to do two things:
(1) Tell what you could add to each side of the sentence to solve it.
(2) Solve the equation.

________ 1. $3w + 5 = 9w - 13$
____

________ 2. $12 - 6x \geq 7 + 4x$
____

________ 3. ${}^-5y + 8 < 2y - 6$
____

________ 4. $9 - a = 2a - 3$
____

Solve each of the following sentences.

________ 5. $4(x - 3) = {}^-3(x - 3)$

________ 6. $20(n - 4) \geq 8n - 20$

________ 7. $5(p + 2) \leq 3p$

________ 8. $9x + 15 - 6x = {}^-6 - 2x - 4$

________ 9. ${}^-8 - 4m = 2m - 2$

________ 10. $30(t - 2) \geq 50t$

Chapter 8, Lessons 7 and 8
Supplementary Worksheet 3

Name ______________________

Date ______________________

Solve each of the following sentences:

________ 1. $^{-}9d + 3 = 6d + 18$ ________ 2. $3(2y - 6) \geq 6(y + 4)$

________ 3. $6(w + 2) \leq 4w - 6$ ________ 4. $10m + 3 - 6m = 2 - 5m + 8$

________ 5. $7(k - 4) < 8 - 2k$ ________ 6. $17x - 8x = 3x$

________ 7. $5(3n + 2) > 3(1 + 5n)$ ________ 8. $16 - 7p > 12 + 5p$

________ 9. $16t + 5 = 8(3 + 2t)$ ________ 10. $^{-}6(y + 1) = 4 - 6y - 10$

Chapter 8 Name __________________

Quiz 1 (Lessons 1 - 2) Date __________________

You may use your textbook to answer questions 1 - 3.

Each given statement follows from one of the postulates listed in Lesson 1 on page 345. Name the postulate.

__________ 1. $^{-}8 + 15 = 15 + ^{-}8$

__________ 2. $5.4 + ^{-}5.4 = 0$

__________ 3. If $4y + 3 \geq 6$, then $4y \geq 3$.

Simplify.

__________ 4. $x - 0.8x$

__________ 5. $w + 3w - 8w$

__________ 6. $5t - t$

Give an expression which answers each question. If the expression can be simplified, do so.

__________ 7. You put an amount Y in a savings account which gives 7% interest in a year. How much will you have at the end of one year?

__________ 8. The price of a shirt is originally M. The price is reduced 10%. What is the new price?

Solve.

__________ 9. $k + 3k + 8 < 4$ __________ 10. $p + 0.6p = 16$

Chapter 8 Name________________________

Quiz 2 (Lessons 3 - 4) Date________________________

1. Give all solutions to each sentence.

______ a. $4x = 0$

______ b. $\frac{3}{y} = 0$

2. What value can the variable not have?

______ a. $\frac{4}{x - 8}$ ______ b. $\frac{k - 7}{7k}$

3. Find an equal expression which has no parentheses.

______ a. $-(8x - 3)$

______ b. $y - (x + w)$

4. Solve these equations.

______ a. $5(2x - 3) = 25$ ______ b. $9 - (4w + 7) = 10$

__________ 5. Give two expressions which answer the following question:

__________ You have saved \$25. You spend \$12 for a blouse and \$2.50 on lunch. How much do you have left?

Chapter 8 Name ____________________

Quiz 3 (Lessons 5 - 7) Date ____________________

1. Simplify.

________ a. $\frac{2n}{7} + \frac{3n + 1}{7} - \frac{4n}{7}$ ________ b. $\frac{5x}{9} - \frac{2 + 3x}{9}$

______ 2. Express with two or more terms: $\frac{48x - 8}{8}$

3. For each of the following sentences, you are to do two things:

   1) Tell what you could add to each side of the sentence to solve it.
   2) Solve the sentence.

1) __________ a. $2x - 10 \geq 7x$ 1) __________ b. $^{-}8 - 7w = 10 + 2w$

2) __________ 2) __________

4. Here are two rent-a-car plans:

   Jimmy's Rent-a-car: $16 a day plus 20¢ a mile
   Carol's Rent-a-car: $14 a day plus 25¢ a mile

________ a. Give the cost of driving x miles with Jimmy's Rent-a-car.

________ b. Give the cost of driving x miles with Carol's Rent-a-car.

________ c. What sentence would you solve to show that Jimmy's Rent-a-car is cheaper?

Chapter 8 Test

Name ______________________

Date ______________________

1. Simplify.

________ a. $y + 0.07y$

________ b. $\frac{5}{a} + \frac{^-5}{a}$

________ c. $\frac{7x}{9} + \frac{3x + 1}{9}$

________ d. $m - m + 3m - 6m$

________ e. $t - 0.27t$

________ f. $\frac{5x}{3} - \frac{2x + 7}{3}$

2. Find an equal expression which has no parentheses.

________ a. $-(4x - 5)$

________ b. $4 - 6(x + 2)$

3. Solve each of the following sentences.

________ a. $4(3x - 1) \geq {}^-28$

________ b. $n - 5n + 8 > {}^-12$

________ c. $8 - 3(y - 3) = 6y + 44$

________ d. $\frac{x + 10}{6} = 10$

(Go on to the next page.)

For questions 4 and 5, you are to do two things:
- (a) Find a sentence which can be used to answer the given question.
- (b) Answer the question.

(a) __________
(b) __________

4. After a 20% discount, the price of a toy is \$16. What was the original price of the toy?

(a) __________
(b) __________

5. A woman dies and leaves her estate to her son and three nieces. The total value of the estate was about \$35,000. If each niece will receive one-fourth of what her son receives, how much should each niece receive?

6. Here are two rent-a-car plans.

Lee's Rental Company : \$12 a day plus 14¢ a mile
Akana's Rental Company: \$16 a day plus 8¢ a mile

__________ a. What is the cost of driving n miles with Lee's Rental Company?

__________ b. What is the cost of driving n miles with Akana's Rental Company?

__________ c. When is it cheaper to rent a car with Akana's Rental Company?

7. Express the fraction with two or more terms.

__________ a. $\frac{4y + 2y + 16}{2}$ __________ b. $\frac{54w + 12w + 18}{6w}$

8. Give all solutions to each sentence.

__________ a. $\frac{4}{B} = 0$ __________ b. $6n = 0$

9. What value can the variable not have?

__________ a. $\frac{1}{y + 4}$ __________ b. $\frac{w + 3}{2w}$

ANSWER KEY

Chapter 8, Supplementary Worksheet 1

1. $^-7x - 63$ 2. $^-20 + 10w$ 3. $^-9k + 54$ 4. $^-2a - 5$

5. $7 - x + r$ 6. $^-5h - hk$ 7. $^-4 - j$ 8. $21 - 3t$

9. $x \geq {}^-6$ 10. $m = {}^-2$ 11. $v > 4$ 12. $k = {}^-15$

13. $y \leq 0$ 14. $x = 4$

Chapter 8, Supplementary Worksheet 2

1. Add ^-3w or $^-5$ or 13 or ^-9w
Answer: $w = 3$

2. Add $^-12$ or $6x$ or $^-7$ or ^-4x
Answer: $x \leq \frac{1}{2}$

3. Add $5y$ or $^-8$ or ^-2y or 6
Answer: $y > 2$

4. Add $^-9$ or a or ^-2a or 3
Answer: $a = 4$

5. $x = 3$ 6. $n \geq 5$ 7. $p \leq {}^-5$ 8. $x = {}^-5$ 9. $m = {}^-1$

10. $t \leq {}^-3$

Chapter 8, Supplementary Worksheet 3

1. $d = {}^-1$ 2. no solution 3. $w \leq {}^-9$ 4. $m = \frac{7}{9}$ 5. $k < 4$

6. $x = 0$ 7. n may be any real number 8. $p < \frac{1}{3}$

9. no solution 10. y may be any real number

Chapter 8, Quiz 1 *(10 points)*

(2) 1. Commutative Property of Addition 2. Additive Identity Property

(4) 3. Addition Property of Equations 4. $0.2x$ 5. ^-4w 6. $4t$

(4) 7. $1.07Y$ 8. $0.90M$ 9. $k < {}^-1$ 10. $p = 10$

Chapter 8, Quiz 2 *(10 points)*

(4) 1. a. $x = 0$ b. no solution 2. a. $x \neq 8$ b. $k \neq 0$

(4) 3. a. $^-8x + 3$ b. $y - x - w$ 4. a. $x = 4$ b. $w = {}^-2$

(2) 5. $25 - 12 - 2.50$ and $25 - (12 + 2.50)$

(Go on to the next page.)

Chapter 8 Answer Key - Page 2

Chapter 8, Quiz 3 *(10 points)*

(2) 1. a. $\frac{n + 1}{7}$ b. $\frac{2x - 2}{9}$ *(1)* 2. $6x - 1$

(4) 3. a. 1) Add ${}^-2x$ or 10 or ${}^-7x$ b. 1) Add 8 or $7w$ or ${}^-10$ or ${}^-2w$
2) $x \leq {}^-2$ 2) $w = {}^-2$

(3) 4. a. $16 + 0.20x$ b. $14 + 0.25x$ c. $16 + 0.20x < 14 + 0.25x$

Chapter 8 Test *(50 points)*

(12) 1. a. $1.07y$ b. 0 c. $\frac{10x + 1}{9}$ d. ${}^-3m$ e. $0.73t$

f. $\frac{3x - 7}{3}$ *(4)* 2. a. ${}^-4x + 5$ b. ${}^-6x - 8$

(8) 3. a. $x \geq {}^-2$ b. $n < 5$ c. $y = {}^-3$ d. $x = 50$

(4) 4. (a) $x - 0.2x = 16$ (b) Original price was $20.

(4) 5. (a) $3x + 4x = 35000$ where x = the amount each niece should receive
(b) Each niece should receive $5000.

(6) 6. a. $12 + 0.14n$ b. $16 + 0.08n$ c. $12 + 0.14n > 16 + 0.08n$

(4) 7. a. $3y + 8$ b. $11 + \frac{3}{w}$ *(4)* 8. a. no solution b. $n = 0$

(4) 9. a. $y \neq {}^-4$ b. $w \neq 0$

Chapter 9 - Slopes and Lines

Lesson 1: Types of Graphs, pp. 393 - 401

Objectives:
1) To read graphs.
2) To tell whether a graph is discrete or continuous.

Vocabulary: discrete, continuous

Comments: Read T9-4.

Be sure to have students discuss their answers for the QCR and the QTU. Transparency masters of the graphs for situations 1 through 3 are provided to help in the discussion of the QCR.

Some students may have difficulty understanding the graph for situation 3. You may want to spend the time showing the students how the graph was constructed.

"REAL" EXAMPLES

Have students bring in examples of graphs found in newspapers and magazines.

Suggested Assignments:
1) QCR, 2 examples of graphs from the newspaper and/or magazine
2) QTU

Lesson 2: Equations for Graphs, pp. 402 - 406

Objectives:
1) To graph equations by making a table of ordered pairs and graphing them.
2) To find an equation given the graph of some of its points or a table of ordered pairs.

Vocabulary: graph of the solution set of the equation, hyperbola

Comments: Read T9-5.

Review the terminology introduced in Lesson 8 of Chapter 2 on graphing: ordered pair, x-axis, y-axis, horizontal, vertical, x-coordinate, y-coordinate, and origin. Encourage students to use these terms in their discussion of graphing equations.

Be sure to stress that the coordinates for the origin is (0,0) and NOT just 0.

It is important that the students know what it means to graph an equation. Students should realize that it means to graph all the solutions for an equation.

Have students arrange their solutions to the equations on page 405 in tables as shown:

MAKE TABLES

$y = 10x$

x	y
0	0
1	10
3	30

Supplementary Worksheet 1 provides practice in graphing horizontal and vertical lines and in finding the equations given the graphs of horizontal and vertical lines. It is recommended that this worksheet be part of the assignment for this lesson.

Assign Supplementary Worksheet 2 along with the "Questions for exploration" on page 406. This worksheet contains exercises on finding the equation given a table of ordered pairs. Be sure to have students discuss how they obtained their answers for both sets of these exercises. Warn students that some of the "Questions for exploration" are difficult!

Suggested Assignments:
1) QCR, QTU
2) Supplementary Worksheets 1 and 2, QE

QUIZ 1 Anytime after Lesson 2

Lesson 3: Rate of Change, pp. 407 - 411

Objective: To calculate the rate of change in a real situation.

Vocabulary: rate of change

Comments: Read T9-6.

Some students may have difficulty calculating change in height when "borrowing" is necessary. For example, here is a common error:

$$\xcancel{5'4'' - 4'5'' = 9''}$$

WRONG!

Be sure to review similar problems with the class.

Suggested Assignments: QCR, QTU

Lesson 4: Slope, pp. 412 - 416

Objective: To calculate the slope determined by two given points.

Vocabulary: slope

Comments: Read T9-7.

$\frac{\text{RISE}}{\text{RUN}}$

Slope is sometimes defined as $\frac{\text{rise}}{\text{run}}$. Although this definition is not used in this text, it is just another way of saying $\frac{\text{change in y-coordinates}}{\text{change in x-coordinates}}$. You may want to discuss this with the class.

0 SLOPE
or
NO SLOPE

QCR #16 on page 415 asks students to calculate the slope of a horizontal segment. Be sure to discuss the concept of zero slope with the students. Although the concept of no slope is not introduced until Lesson 9 of the text, you may want to discuss it at this time too. Emphasize the difference between a slope of zero and no slope.

TWO
WAYS

Be sure to point out to the students that the slope can be computed in either of two ways and the result is the same. For instance, suppose you are given two points, (8,4) and (3,7). The slope can be computed as

$$\frac{4 - 7}{8 - 3} = \frac{-3}{5} \quad \text{or} \quad \frac{7 - 4}{3 - 8} = \frac{3}{-5}$$

Students should also understand that $\frac{-3}{5}$ is the same as $\frac{-3}{5}$ or $\frac{3}{5}$.

Suggested Assignments:
1) QCR
2) QTU, QD

Lesson 5: The Slope of a Line, pp. 417 - 422

Objectives:
1) To find the slope of a line given its equation or its graph.
2) To graph a line given its equation.

Comments: Read T9-8.

Be sure to emphasize that the slope of a line can be calculated using any two points on it. Several examples similar to the one that appears on page 418 should be discussed as a class.

You may want to have students demonstrate to the rest of the class how to find the slope of a line.

Suggested Assignments:
1) QCR
2) QTU: #13 - 16, Supplementary Worksheet 3

QUIZ 2 Anytime after Lesson 5

Lesson 6: Slope-Intercept Equations for Some Lines, pp. 423 - 428

Objective:
1) To determine the slope and y-intercept of a line given its equation.
2) To give an equation for a line whose slope and y-intercept are given.

Vocabulary: y-intercept, slope-intercept equation

Comments: Read T9-9.

Read through the lesson with the students. Discuss the examples in the lesson carefully. Transparency masters of the graphs shown on pages 423 and 424 are provided to help in the discussion.

Here are some exercises you may want the students to do as a class:

1) Give the slope and y-intercept of each line.
   a) $y = 7x - 5$
   b) $y = 2 - 6x$
   c) $y = x + 3$
   d) $y = 3(x + 1)$
   e) $y = 2x$
   f) $y = (3 + 4x)/5$

2) Give an equation for the line with:
   a) slope 1, y-intercept 5
   b) slope $^-4$, y-intercept $^-2$
   c) slope 3/4, y-intercept 0
   d) slope 0, y-intercept 9

Be sure to have the students discuss their answers for the QTU.

Suggested Assignments:
1) QCR: #1 - 30
2) QCR: #31 - 34, QTU: #1 - 12

Lessons 7 - 8: OMIT

Lesson 9: Horizontal and Vertical Lines, pp. 440 - 442

Objective: To determine whether a given equation determines a horizontal, vertical, or oblique line.

Vocabulary: oblique

Comments: Read T9-13.

Emphasize again the difference between the statements "the line $y = 2$ has zero slope" and "the line $x = 5$ has no slope." "No slope" means that the slope is undefined.

Suggested Assignments: QCR, QTU (except #5 and 6)

Lesson 10: Equations for All Lines, pp. 443 - 444

Objective: To learn why lines are important in the study of this course.

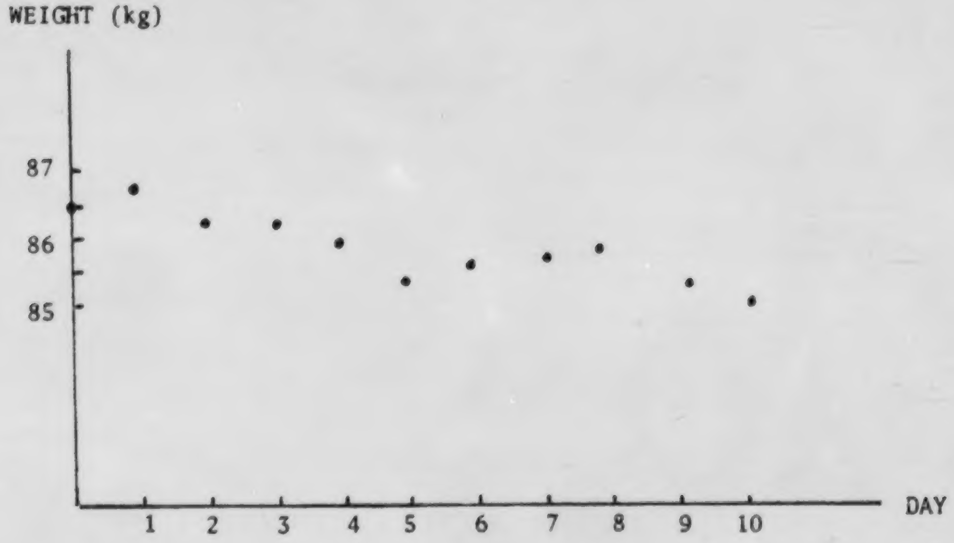
Comments: Assign only the reading of page 443 and the first two paragraphs of page 444. The rest of the lesson should be omitted.

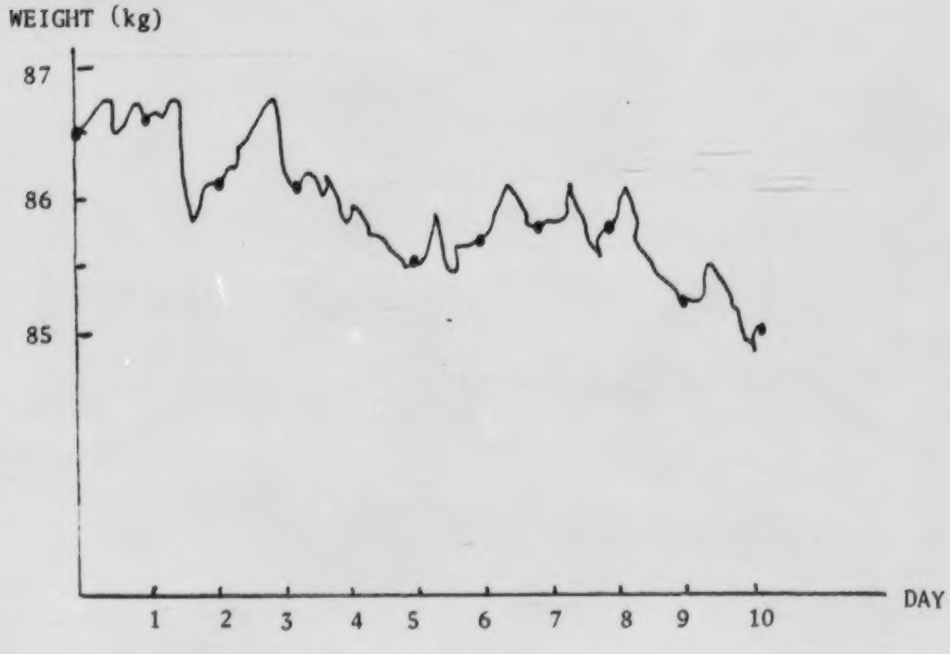
Chapter Summary

Comments: Although not all the lessons were assigned, students should read the Chapter Summary.

Chapter 9 Test

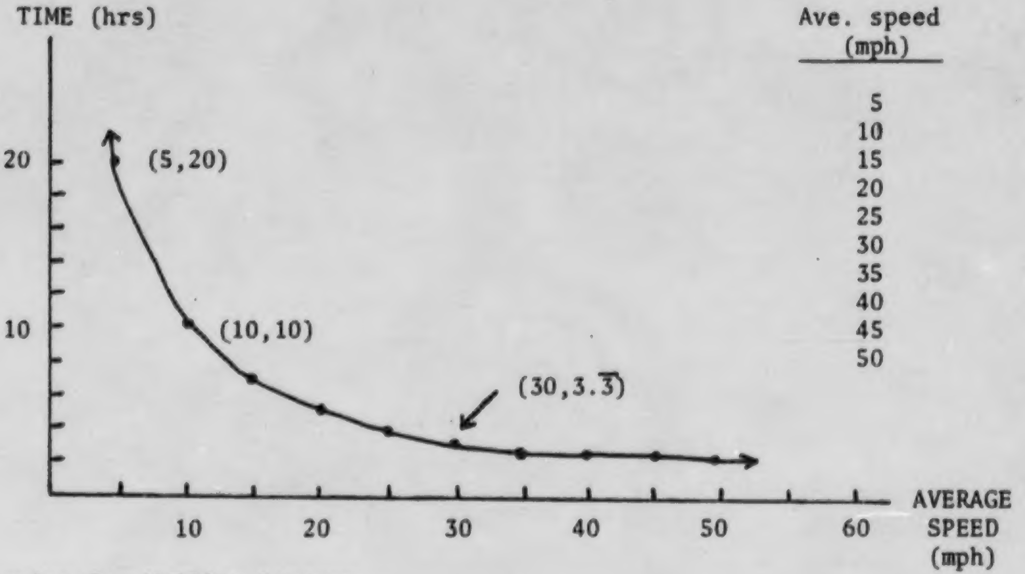
Chapter 9, Lesson 1
Transparency 1
Situation 1: A Diet





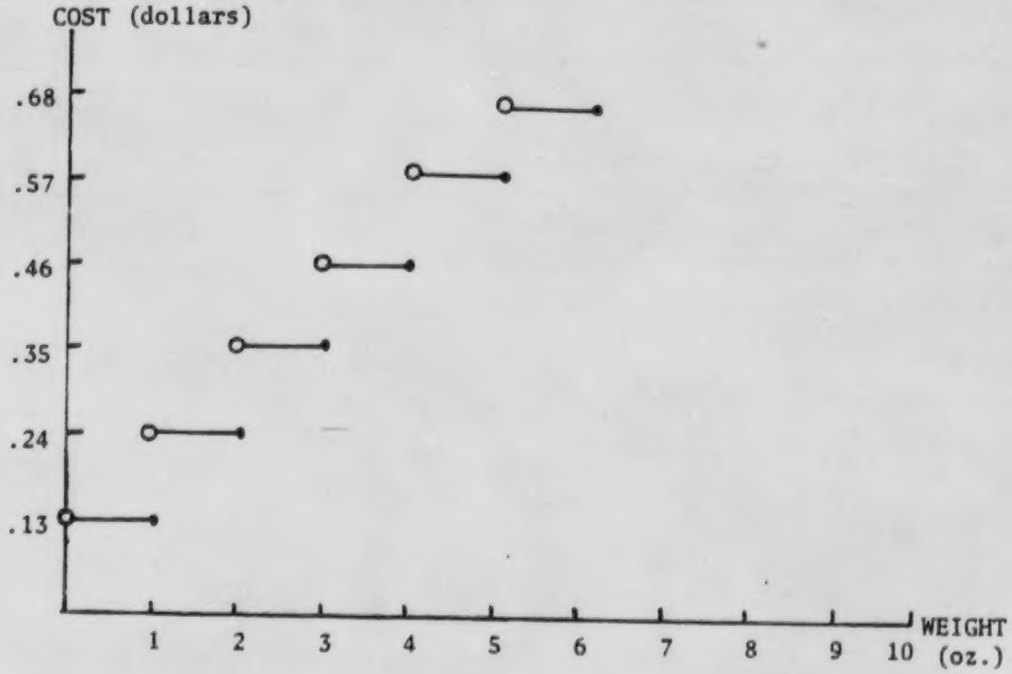
Chapter 9, Lesson 1
Transparency 2

Situation 2: Going 100 miles, how fast and how long?



Ave. speed (mph)	Time (hours)
5	20
10	10
15	6.$\overline{6}$
20	5
25	4
30	3.$\overline{3}$
35	2.8...
40	2.5
45	2.$\overline{2}$
50	2

Situation 3: Mailing letters.



Some points

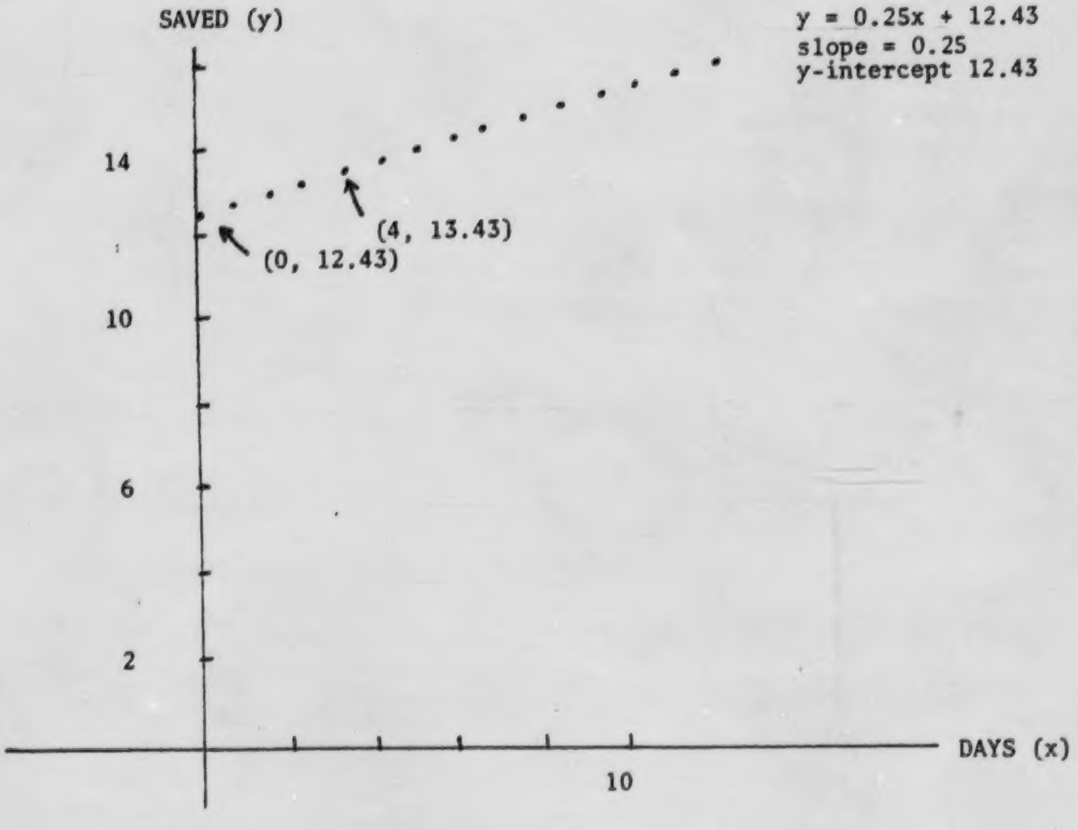
(0, 12.43)

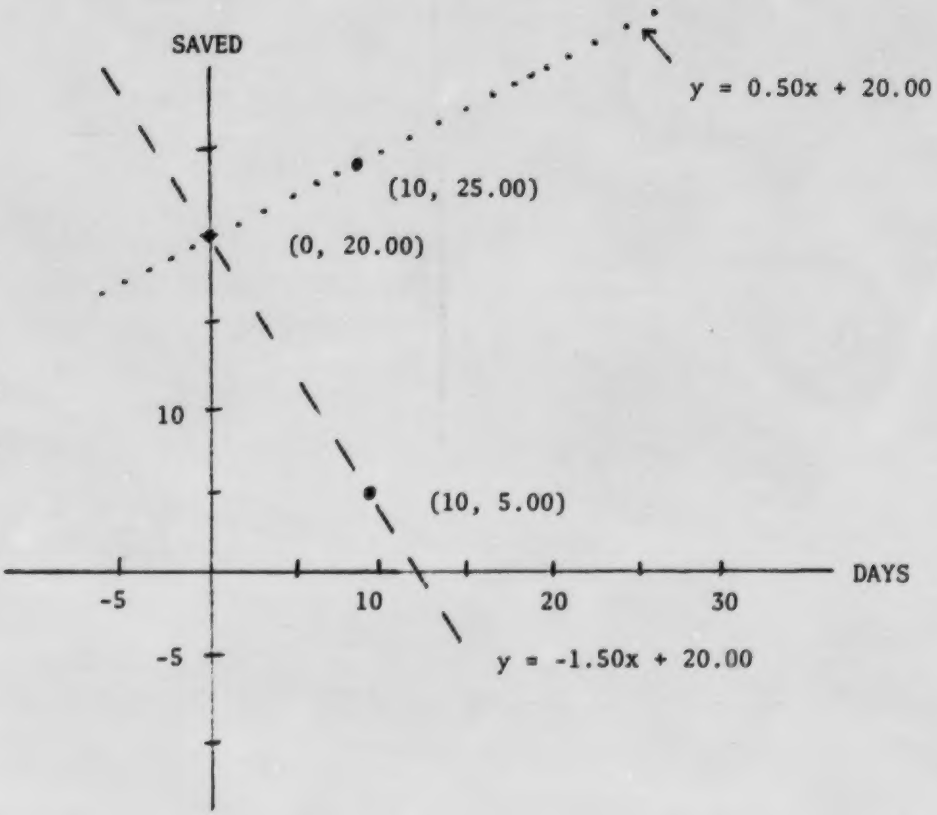
(1, 12.68)

(2, 12.93)

(3, 13.18)

(4, 13.43)





Examples:

1. Begin with $20.00. Save $.50 a day.

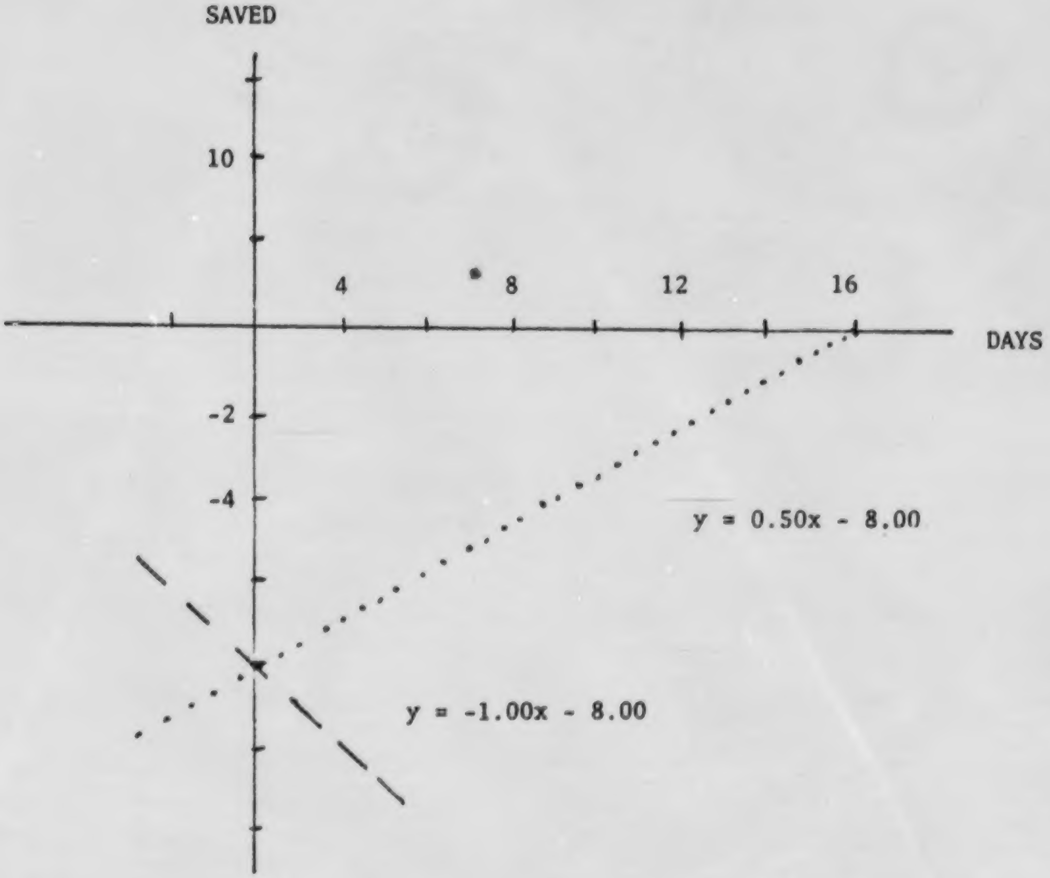
   Equation: $y = 0.50x + 20.00$

   (Graphed dotted)

2. Begin with $20.00. Spend $1.50 a day.

   Equation: $y = -1.50x + 20.00$

   (Graphed dashed)



3. Begin $8.00 in debt. Pay it off $.50 a week.

   Equation: $y = 0.50x - 8.00$

   (Graphed dotted)

4. Begin $8.00 in debt. Spend $1.00 a week.

   Equation: $y = -1.00x - 8.00$

   (Graphed dashed)

Chapter 9, Lesson 2
Supplementary Worksheet 1

Name ____________________

Date ____________________

1. a. Make a table of 5 solutions to the equation: $x = 3$, that is, find 5 ordered pairs whose x-coordinates are 3. For example, (3, 4) is a solution to the equation.

   b. Graph the five solutions on a copy of graph sheet A.

   c. Graph five more solutions to the equation.

________ d. How many solutions does the equation, $x = 3$, have?

   e. Graph all the solutions to the equation.

________ f. What geometric figure is formed by graphing all the solutions to the equation?

   g. Label the graph by writing its equation on it.

2. a. Make a table of 5 solutions to the equation: $y = 3$, that is, find 5 ordered pairs whose y-coordinate is 3. For example, (2, 3) is a solution to the equation.

   b. Graph the five solutions on the same graph sheet you used for exercise 1.

   c. Graph five more solutions to the equation.

________ d. How many solutions does the equation, $y = 3$, have?

   e. Graph all the solutions to the equation.

________ f. What geometric figure is formed by graphing all the solutions to the equation?

   g. Label the graph by writing its equation on it.

3. Obtain another copy of graph sheet A. For each equation below, you must do four things:

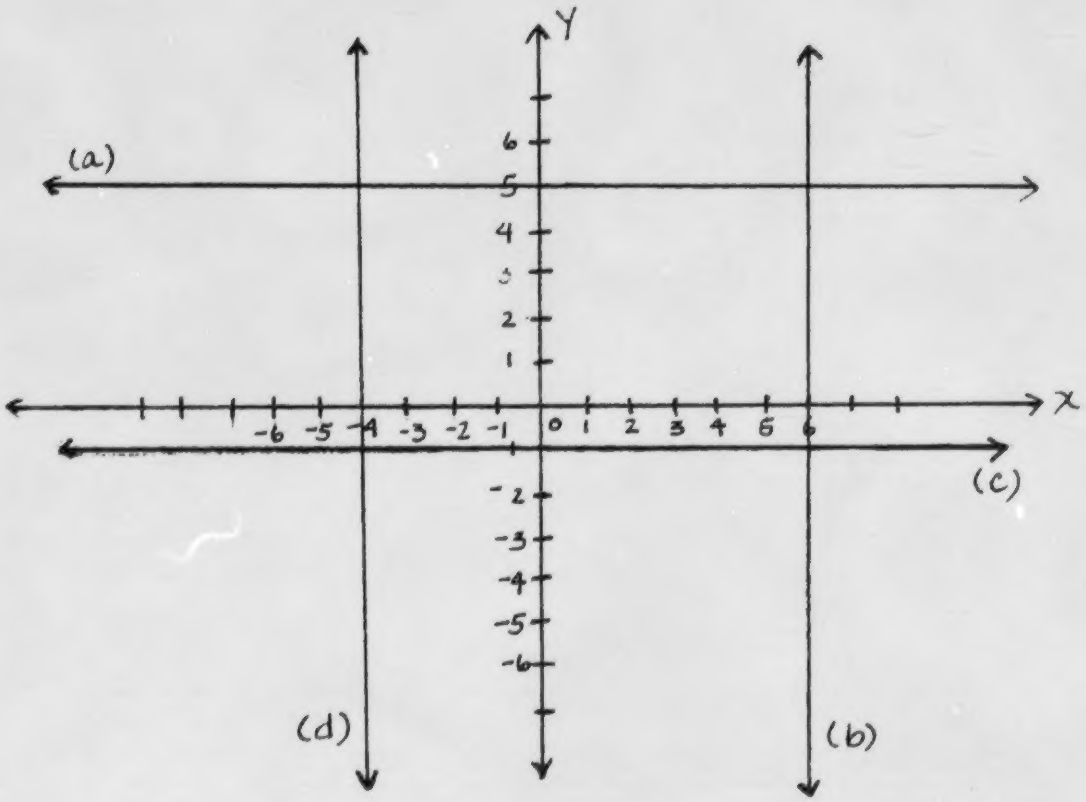
   (1) make a table of 5 solutions to the equation.
   (2) graph the five solutions on graph sheet A.
   (3) graph the equation--that is, graph all the solutions for the equation.
   (4) label the graph by writing its equation on it.

a. $x = 2$
c. $y = 0$
e. $x = 5\frac{1}{2}$
b. $y = {}^{-}5$
d. $x = {}^{-}3$
f. $y = x$

(Go on to the next page.)

4. The graphs of 4 lines are shown below. For each graph you must do two things:

   (1) list five points that are on the graph.
   (2) write the equation of the graph.



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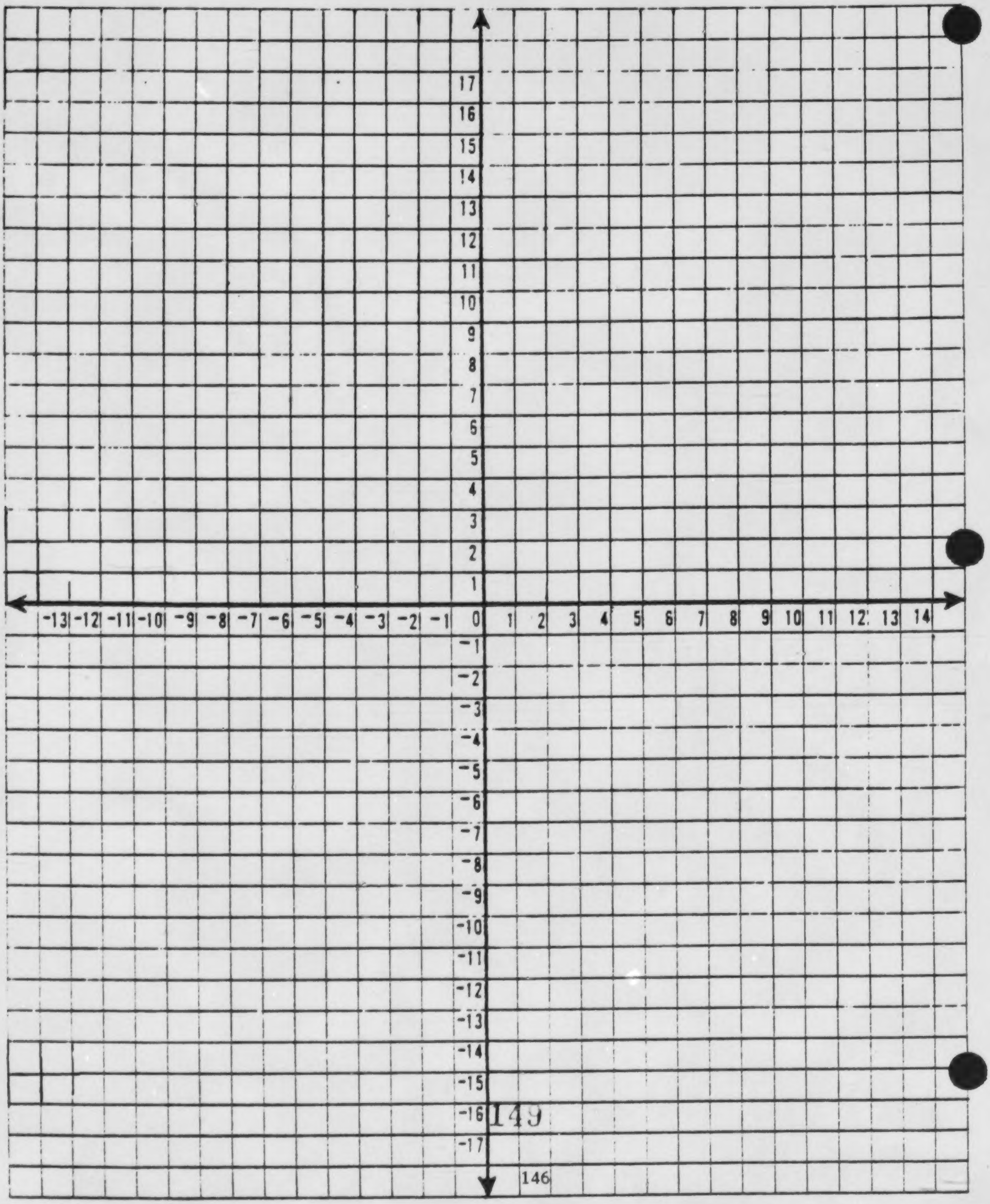
Chapter 9, Lesson 2
Supplementary Worksheet 1 - Graph Sheet A

Name ______________________

Date ______________________



17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
-13
-12
-11
-10
-9
-8
-7
-6
-5
-4
-3
-2
-1
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
-11
-12
-13
-14
-15
-16
-17

Chapter 9, Lesson 2
Supplementary Worksheet 2

Name ______________________________

Date ______________________________

Write an equation for the set of points given in each table below.

__________ 1.

x	y
1	2
2	4
3	6
4	8
5	10

__________ 2.

x	y
1	4
2	5
3	6
4	7
5	8

__________ 3.

x	y
1	8
2	9
3	10
4	11
5	12

__________ 4.

x	y
1	12
2	22
3	32
4	42
5	52

__________ 5.

x	y
1	3
2	6
3	9
4	12
5	15

__________ 6.

x	y
1	5
2	9
3	13
4	17
5	21

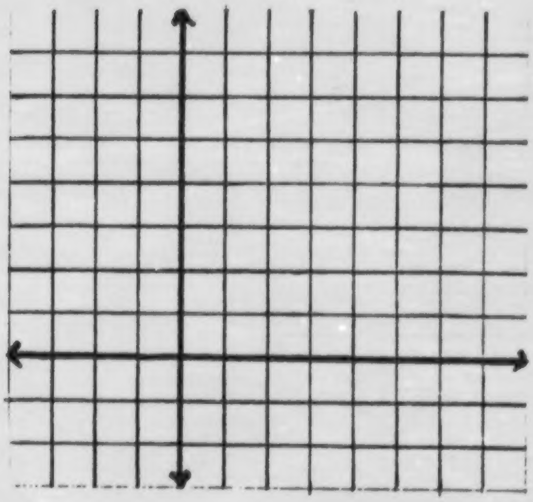
Chapter 9

Quiz 1 (Lessons 1 - 2)

Name________________________________

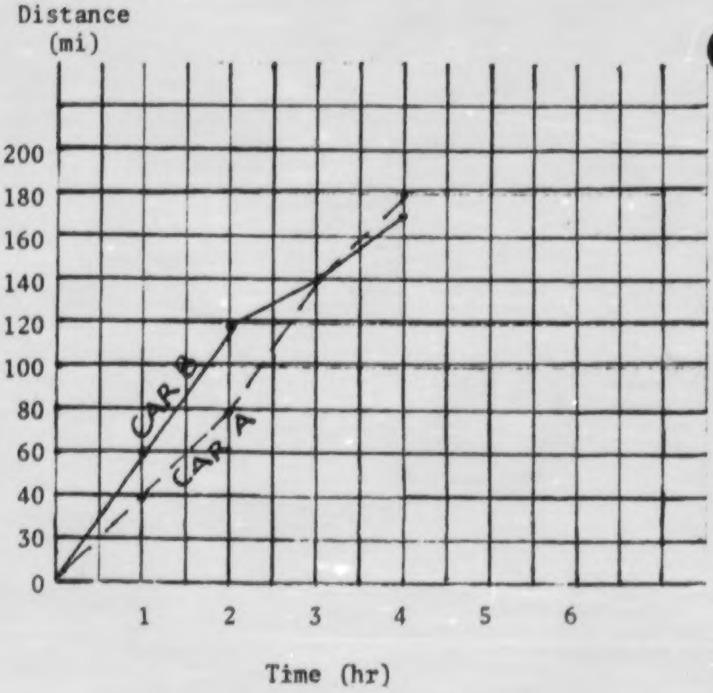
Date________________________________

Figure x



1. a. List 4 solutions to the equation: $y = 2x - 1$.

   b. Graph the solutions in Figure x.



2. Look at the graph on the right to answer the following questions:

____________ a. Is the graph for car B discrete or continuous?

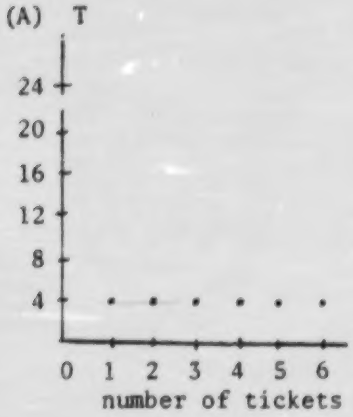
____________ b. At 2 o'clock which car had traveled farther? How much farther?

____________ c. At what time did car A overtake car B?

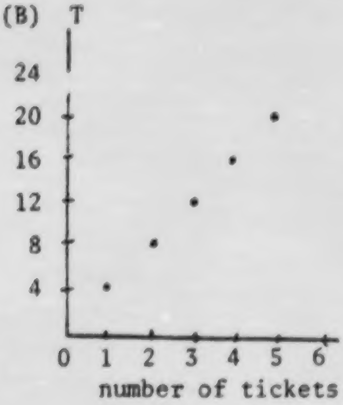
(Go on to the next page.)

Suppose you have $20 and movie tickets cost $4 apiece.
Use these graphs to answer questions 3-5.

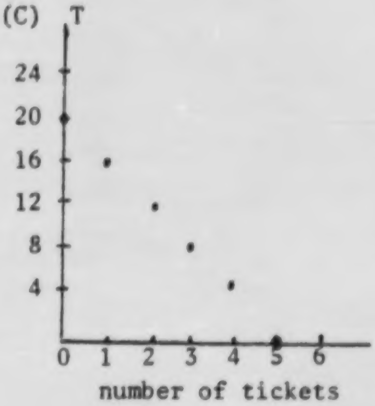
(A)



(B)



(C)



________ 3. Which graph shows the total amount T you have paid?

________ 4. Which graph shows the cost T of the nth ticket?

________ 5. Which graph shows the amount T you will have left after buying n tickets?

6. For each graph, you must do two things:

(1) List three points that are on the graph.

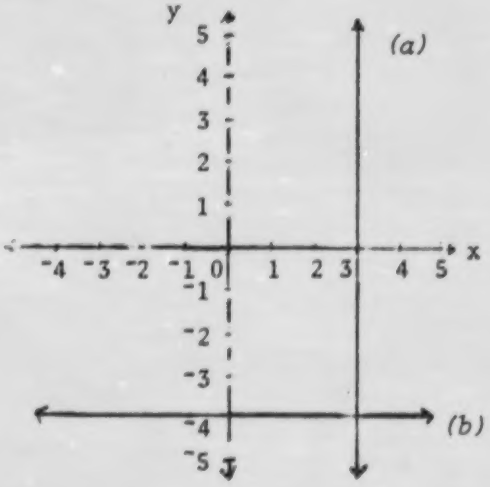
(2) Write the equation of the graph.

a. (1) ________________

(2) ________________

b. (1) ________________

(2) ________________



________ 7. Write an equation for set of points given in the table:

x	y
1	5
2	6
3	7
4	8

Chapter 9 Name________________________

Quiz 2 (Lessons 3-5) Date________________________

__________ 1. At age 14 Fred weighed 110 pounds. At age 17 he weighed 155 pounds. Calculate Fred's rate of change in weight per year from age 14 to age 17.

2. Calculate the slope for each pair of points. Tell what the slope stands for:

__________ a. Apples: (5 lbs., \$4.45), (3 lbs., \$2.67)

____

__________ b. Approximate population of Hawaii: (1960, 630 thousands), (1970, 770 thousands)

____

3. Don has \$20 in his savings account. He adds \$5 each month. Let t be the total amount in the account. Then after m months, $t = 20 + 5m$. (Let m be the first variable.)

a. List 4 solutions to the equation. Then graph these solutions on Figure A.

b. Graph all the solutions to the equation.

__________ c. Find the slope of the line.

__________ d. What does the slope mean?

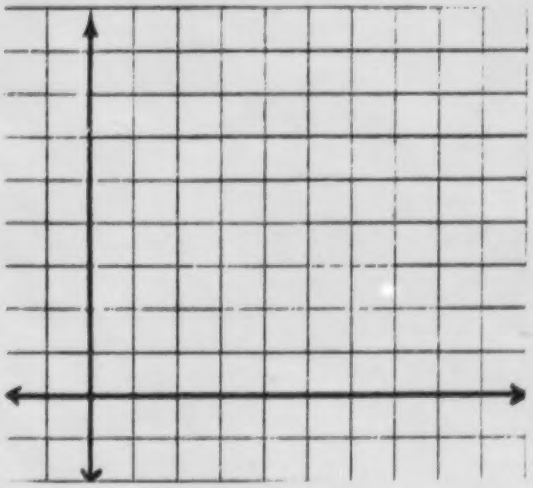


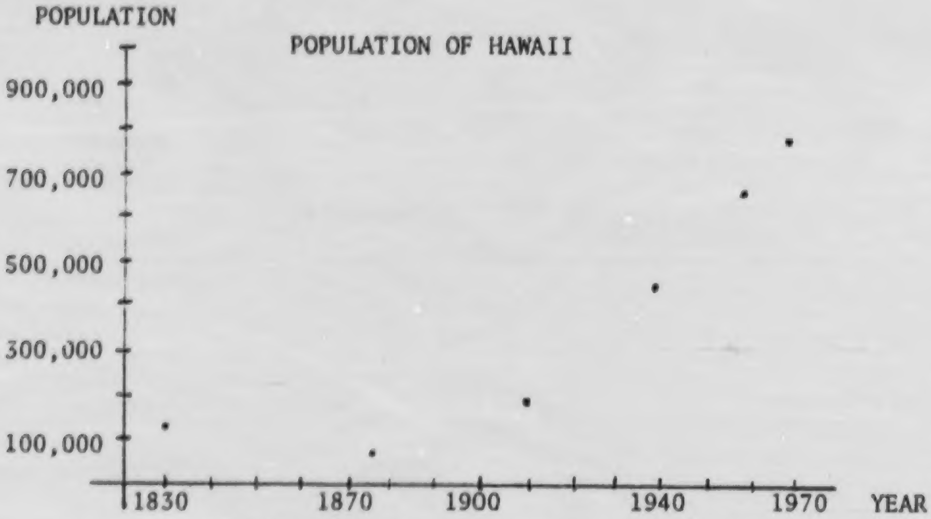
Figure A

Chapter 9 Test

Name ____________________

Date ____________________

The approximate population of Hawaii for some of the years from 1830 to 1970 is graphed below.



__________ 1. Approximately what was the increase in population between 1910 and 1940?

__________ 2. Between what years did the population decrease?

__________ 3. What would you predict for the population of Hawaii in 1980?

__________ 4. In 1965 there were 450 students in a school. In 1970 there were 565 students. Calculate the rate of change in school population per year from 1965 to 1970.

5. Calculate the slope for:

__________ a. the pair of points: (6,40), (8,80)

__________ b. the pair of points: $(5,{}^{-}4)$, $(8,{}^{-}2)$

__________ c. $y = {}^{-}8$

__________ d. $x = 4$

(Go on to the next page.)

6. Mike has \$10. He spends \$1.50 a day. Let y be the total amount of money he has. Then after x days, $y = 10 - 1.50x$. (Let x be the first variable.)

   a. List 4 solutions to the equation: $y = 10 - 1.50x$. Then graph the solutions on Figure K.

   b. Graph all the solutions to the equation.

   ______ c. Find the slope of the line.

   ______ d. What does the slope mean?

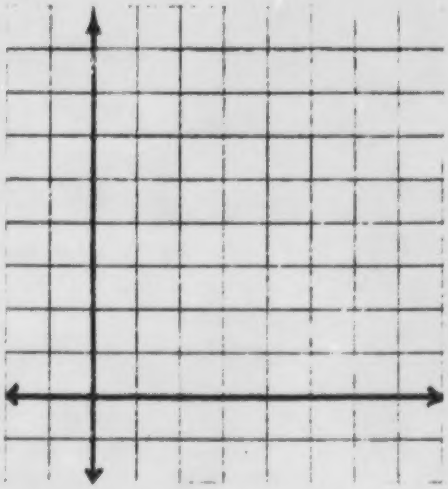


Figure K

7. Each situation below naturally leads to an equation of the form $y = mx + b$. You are to do three things:

   (1) Tell what x and y could stand for.
   (2) Give the equation.
   (3) Graph all the solutions to the equation on the graph sheet. (problem a on Figure M and problem b on Figure N)

   a. A crate weighs 6 kg when empty and an orange weighs 0.2 kg.

   (1) ______

   (2) ______

   (3) Graph all the solutions to the equation on Figure M.

   b. Soft drinks sell for \$.35 each. You have \$10 and want to buy drinks for some friends.

   (1) ______

   (2) ______

   (3) Graph all the solutions to the equation on Figure N.

(Go on to the next page.)

8. Give (1) the slope and (2) the y-intercept of each line.

a. $y = 4x + 5$ b. $y = x$ c. $y = 8 - 15x$

(1) ________ (1) ________ (1) ________

(2) ________ (2) ________ (2) ________

9. For each graph, you must do two things:

(1) List three points that are on the graph.
(2) Write the equation of the graph.

a. ________________

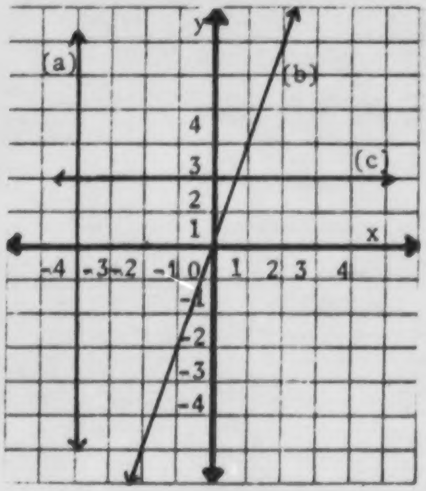
____

b. ________________

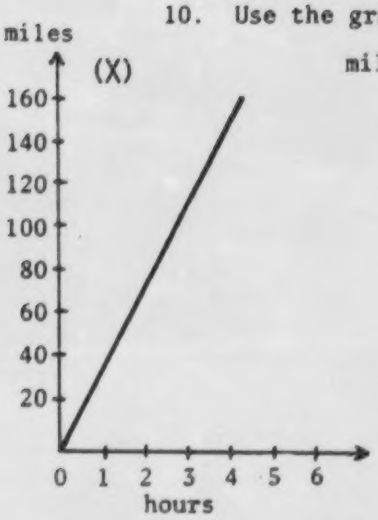
____

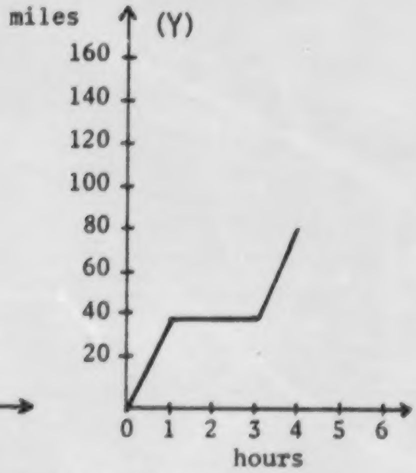
c. ________________

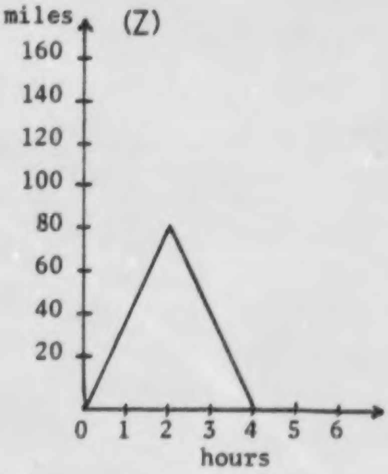
____



10. Use the graphs below to answer the questions:







__________ a. Which graph shows a car that stopped for 2 hours?

__________ b. Which graph shows a car that turned around and went back?

__________ c. Which graph shows a car that traveled 120 miles in 3 hours?

Figure M

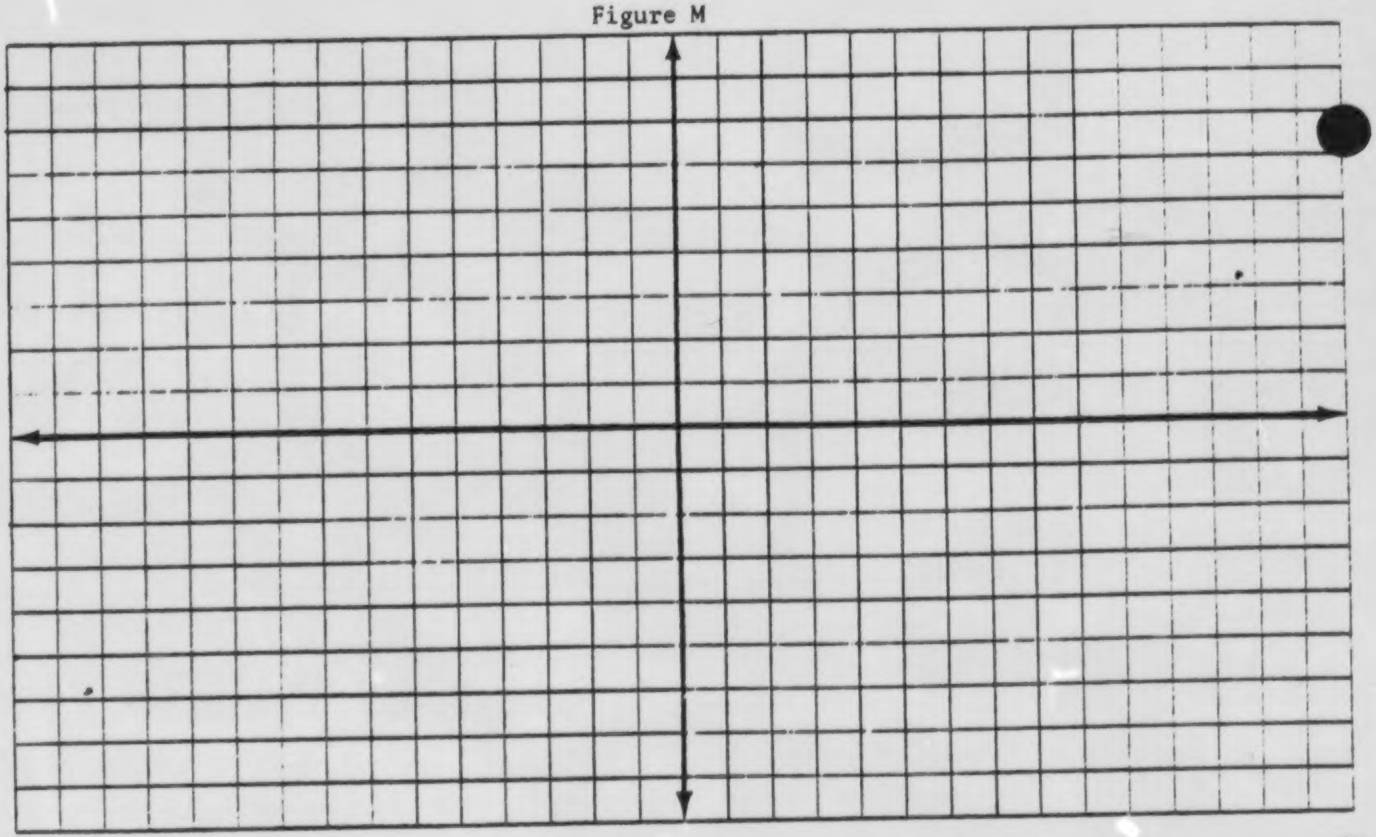
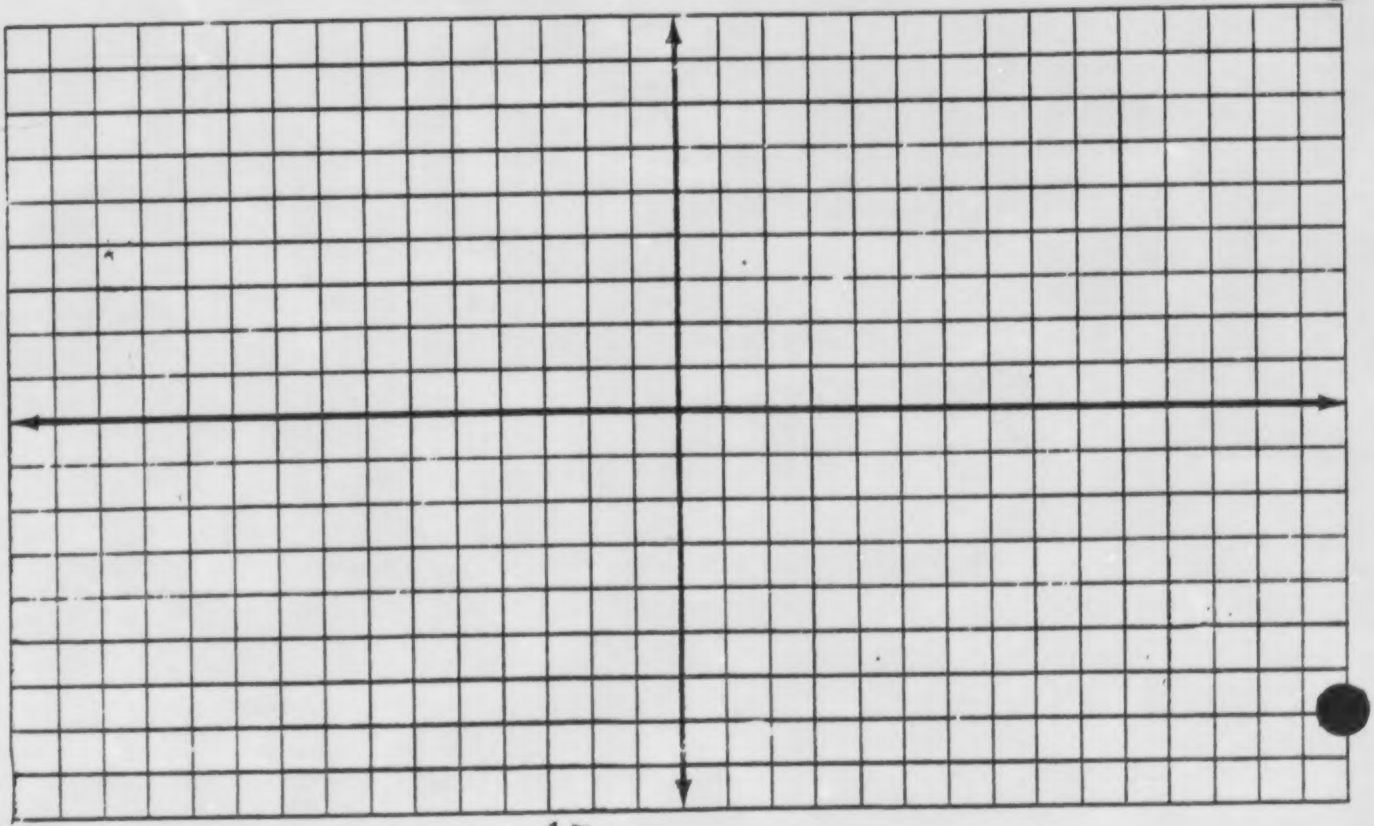


Figure N



ANSWER KEY

Chapter 9, Supplementary Worksheet 1

1. a. - c. Answers will vary. d. an infinite number of solutions

   e. vertical line through points like (3,0), (3,4), and (3,$^-6$)

   f. a line g. Graph should be labeled "x = 3."

2. a. - c. Answers will vary. d. an infinite number of solutions

   e. horizontal line through points like (0,3), (5,3), and ($^-8$,3)

   f. a line g. Graph should be labeled "y = 3."

3. See the graph sheet on the next page for the graphs. Table of solutions will vary.

4. a. 1) Answers will vary.
      2) y = 5

   b. 1) Answers will vary.
      2) x = 6

   c. 1) Answers will vary.
      2) y = $^-1$

   d. 1) Answers will vary.
      2) x = $^-4$

Chapter 9, Supplementary Worksheet 2

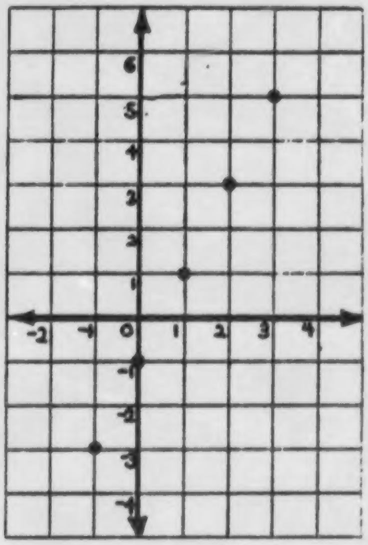
1. y = 2x 2. y = x + 3 3. y = x + 7 4. y = 10x + 2

5. y = 3x 6. y = 4x + 1

Chapter 9, Quiz 1 *(15 points)*

(4) 1. a. Answers will vary.
Possible answers include:
(0,$^-1$), (1,1), (2,3),
(3,5), ($^-1$,$^-3$)

b. See the graph on the right.



(3) 2. a. continuous

b. Car B, 40 miles

c. After 3 o'clock

(3) 3. a. B 4. A 5. C

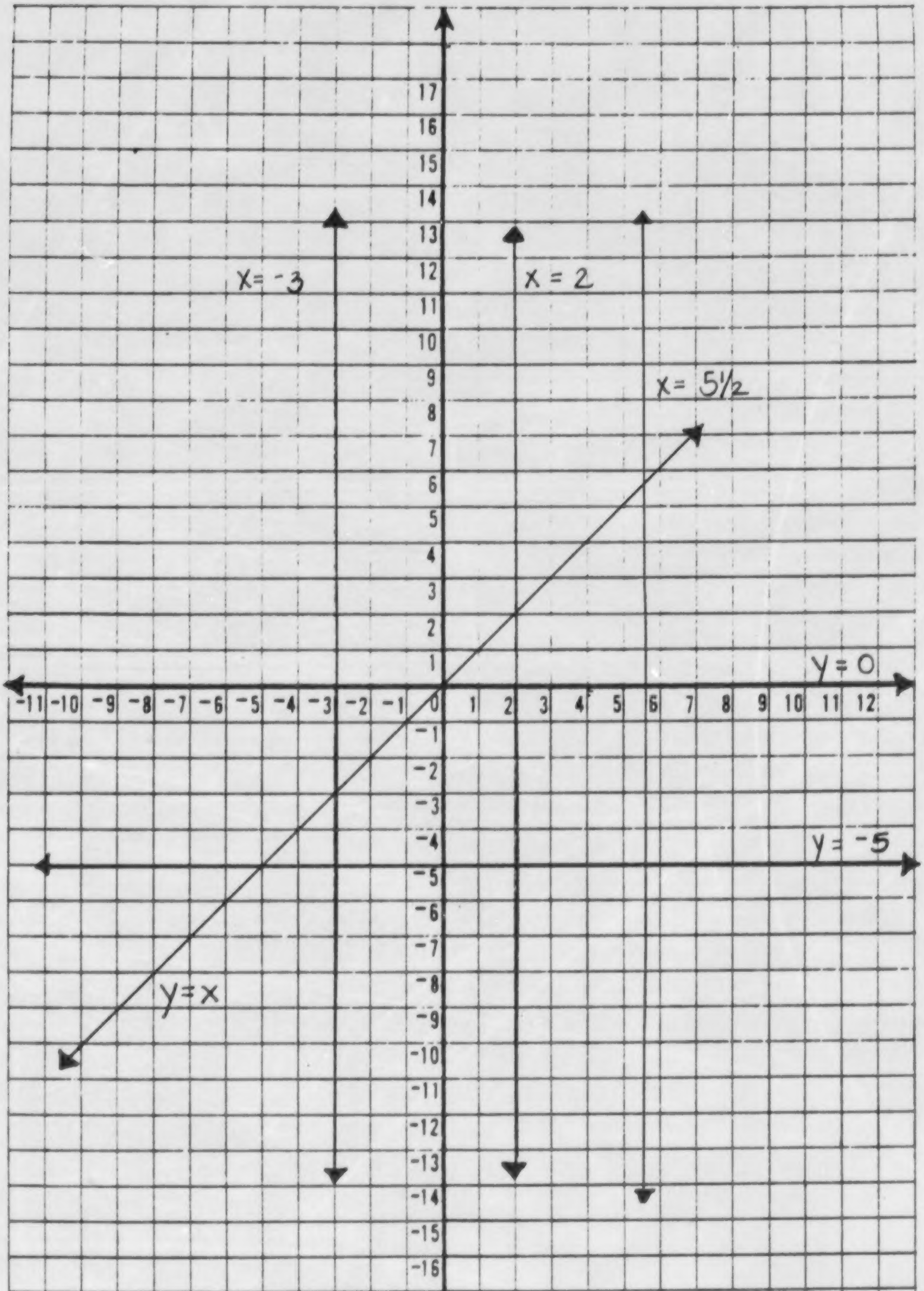
(4) 6. a. 1) Answers will vary.
2) x = 3

b. 1) Answers will vary.
2) y = $^-4$

(1) 7. y = x + 4

(Go on to the next page.)

Supplementary Worksheet 1 - #3



(Go on to the next page.)

Chapter 9 Answer Key - Page 3

Chapter 9, Quiz 2 *(10 points)*

(1) 1. 15 pounds per year

(4) 2. a. 89¢ per pound; cost per pound

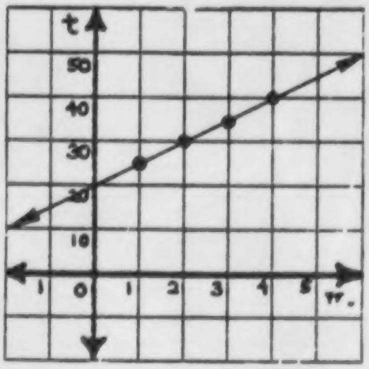
b. 14 thousands per year; rate of change of population per year.

(2) 3. a. Answers may vary.
Possible answers include:
(1,25), (2,30), (3,35), and (4,40).

(1) b. See the graph on the right.

(1) c. 5

(1) d. amount added per month



Chapter 9 Test *(50 points)*

(4) 1. about 240,000 2. between 1830 and 1875

(1) 3. about 900,000 *(2)* 4. 23 students per year

(8) 5. a. 20 b. $\frac{2}{3}$ c. 0 d. no slope

(3) 6. a. Answers may vary. Here are possible answers:
(0,10), (1,8.5), (2,7), and (3,5.5)

(3) b. The line through the points listed in a. c. $^{-}1.50$

d. amount spent per day

(2) 7. a. 1) let x = number of oranges
let y = weight of crate with oranges.

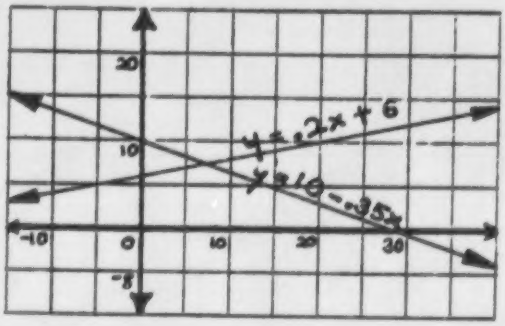
(2) 2) y = 0.2x + 6

(3) 3) The graph is shown on the right.

(2) b. 1) let x = number of soft drinks
let y = amount of money you'll have left.

(2) 2) y = 10 - 0.35x

(3) 3) The graph is shown on the right.



(Go on to the next page.)

(6) 8. a. 1) 4 2) 5 b. 1) 1 2) 0

c. 1) $^{-}15$ 2) $^{-}8$

(6) 9. a. 1) Answers may vary. Here are a few examples:
($^{-}4$,0), ($^{-}4$,5), ($^{-}4$,6)
2) $x = {}^{-}4$

b. 1) Answers may vary. Here are a few examples:
(0,0), (1,3), ($^{-}2$,$^{-}6$)
2) $y = 3x$

c. 1) Answers may vary. Here are a few examples:
($^{-}4$,2), (0,2), (2,2)
2) $y = 2$

(3) 10. a. Y b. Z c. X

Chapter 10 - Powering

Lesson 1: The Repeated Multiplication Model of Powering, pp. 451 - 455

Objectives:
1) To calculate powers.
2) To calculate or write expressions for the amount accrued after principal is invested at a given rate of interest compounded annually.

Vocabulary: powering, nth power, base, exponent

Comments: Read T10-1 through T10-5.

READ AND WRITE EXPRESSIONS

Be sure to provide the opportunity for the students to read aloud and to write expressions like "5^2." Practice should also be provided in writing expressions given in words using exponents. For example, you may want to ask students to write the following expressions using exponents:

1) the 10th power of 8
2) d to the fourth power
3) b cubed
4) x squared
5) 9 to the second power

Emphasize that B^n is another way of writing $\underbrace{B \cdot B \cdot B \cdot \ldots B}_{n\ factors}$ and NOT $B \cdot n$!

Suggested Assignments:
1) QCR
2) QTU: #1 - 10, 11, 14, 15 - 19

Lesson 2: The Permutation Model of Powering, pp. 456 - 461

Objective: To apply the permutation model of powering.

Vocabulary: permutation

Comments: Read T10-6 and T10-7.

Students should be able to read the lesson and answer the QCR on their own. Have them explain in class how they obtained their answers.

Suggested Assignments:
1) QCR: #1 - 19
2) QCR: #20 - 25, QER: #1 - 14, QD #1

Lesson 3: Powering and Order of Operations, pp. 462 - 465

Objectives:	To apply order of operations to simplify or calculate expressions involving powers.
Vocabulary:	compound interest
Comments:	Read T10-8.

The text does not distinguish between the symbols for a negative number and the opposite of a number. For example, "$^{-}3$," represents both "negative three" and "the opposite of three". Parentheses are used to show a power of a negative number. For example, "$(^{-}3)^4$" represents "the fourth power of a negative three" and is equal to $^{-}3 \cdot {}^{-}3 \cdot {}^{-}3 \cdot {}^{-}3$ or 81. On the other hand, "$^{-}3^4$" represents "the opposite of the fourth power of 3" and is equal to $^{-}1 \cdot 3^4$ or $^{-}1 \cdot 3 \cdot 3 \cdot 3 \cdot 3$ or $^{-}81$. Provide students with practice in simplifying both types of problems.

Suggested
Assignments: QCR: #1 - 27, QAR: #1, 2, 4 - 12 (even numbers)

QUIZ 1 Anytime after Lesson 3

Lesson 4: The Growth Model of Powering, pp. 466 - 472

Objectives:
1) To apply the growth model of powering.
2) To use the zero power to simplify expressions.
3) To calculate or write expressions for the amount accrued after principal is invested at a given rate of interest compounded annually.

Vocabulary: exponential

Comments: Read T10-9 and T10-10.

Read through the lesson with the students. You may want to list on the blackboard ideas which are associated to linear growth or exponential growth. (Be sure to have students contribute to this list!) For example, your list may look like this:

Linear Growth	Exponential Growth
add	multiply
slope	base
simple interest	compound interest
	population growth

Point out to the students the use of underlining and boxes in the text to stress important ideas.

Discuss the examples in the lesson carefully. You may want to ask questions like the following for the example on interest:

1) Which interest plan is connected to exponential growth--simple or compound?
2) Which interest plan allows you to keep the interest in the account--simple or compound?
3) For the simple interest example, why is \$5 added each year to the account?
4) For the compound interest example, why do you multiply by 1.05 each year?
5) Explain how the amount "$\$100 \cdot (1.05)^2$" was obtained in the account after 2 years.
6) Explain how the amount "$\$100 \cdot (1.05)^3$" was obtained in the account after 3 years.

Similar types of questions may be asked about the other examples.

CALCULATORS A reminder: Calculators are recommended for this lesson. Without a calculator, the problems would require incredible computation.

Suggested Assignments:
1) QCR: #1 - 21
2) QCR: #22 - 33, QE: #1, 2
3) QE: #3 - 7

Lesson 5: The Power Property, pp. 473 - 476

Objectives: To apply the Power Property to simplify expressions of the form $x^m \cdot x^n$.

Comments: Read T10-11 and T10-12.

Be sure to caution students about applying the Power Property. It should be applied only if the bases of the powers are the same. The property cannot be applied to an expression such as $10^2 \cdot 9^2$ or $5^2 \cdot 4^3$.

It is important for students to be provided with the opportunity to read aloud and write expressions such as "$4^3 \cdot 4^8$" and "$2x^2y \cdot 5y^3$." Have students explain how the expressions are simplified too.

Suggested Assignments:
1) QCR, QER: #1 - 5
2) QER: #16 - 42

QUIZ 2 Anytime after Lesson 5

Lesson 6: Negative Exponents, pp. 477 - 481

Objective:	To simplify expressions involving negative exponents into expressions which do not have negative exponents.
Vocabulary:	consistency
Comments:	Read T10-13. Read through the lesson with the students. Discuss the three methods for verifying the Negative Exponent Theorem. The growth model of powering will probably be the most difficult for the students to understand.
Suggested Assignments:	1) QCR 2) QTU

Chapter Summary

Comments: Have the students read and discuss the summary.

Chapter 10 Test

Chapter 10 Name ____________________

Quiz 1 (Lessons 1 - 3) Date ____________________

1. Write without using exponents.

____ a. 3^4 ____ b. $(2.6)^2$ ____ c. $(^-4)^3$

2. Calculate.

____ a. $5 \cdot 2^5$ ____ b. $^-12^2 + 5^3$ ____ c. $2(10)^3 - 3^2$

________ 3. The Hawaiian language has 12 letters: A, E, I, O, U, H, K, L, M, N, P, and W. How many 3-letter words are possible?

4. Suppose you invest $40 at 5% yearly interest and keep the interest in the account.

____ a. What will you have after 1 year?

____ b. What will you have after n years?

________ 5. Jan owns 4 vests, 7 blouses, and 6 pairs of slacks. How many vest-blouse-slack outfits are possible?

Chapter 10

Quiz 2 (Lessons 4 - 5)

Name ______________________

Date ______________________

Simplify as much as possible.

____ 1. $(8a^0b^2)(4a^3)(\frac{1}{8}b^5)$

____ 4. $6x^4y^2 \cdot 2y^3 \cdot x^5$

____ 2. $(3 \cdot 4)^0 \cdot 9$

____ 5. $(^-1)^5 \cdot (^-1)^3$

____ 3. $(4m^2n^2)(6m^5n)$

____ 6. $(\frac{1}{4})^0 + (^-9)^0$

7. Suppose one inch of a certain type of glass allows only $\frac{3}{5}$ of light to go through. How much light will go through:

____ a. 2" of this glass

____ b. n" of this glass

8. If you deposit \$200 at 5% yearly interest compounded, what will you have:

____ a. after 2 years

____ b. after n years

Chapter 10 Test

Name ____________________

Date ____________________

1. Write without using exponents.

________ a. $(\frac{1}{3})^4$ ________ b. $(^-5)^3$ ________ c. 2^5

2. Simplify as much as possible.

________ a. $4^0 + (\frac{1}{3})^0$ ________ e. $4^2 \cdot 2^3$

________ b. $2^3 \cdot 2^4$ ________ f. $(\frac{1}{4} a^2b)(8a^3b^3)(2b)$

________ c. $(5x^2y)(3x^4y^2)$ ________ g. $3 \cdot (2 \cdot 6)^0$

________ d. $3^{^-2} \cdot 3^{^-1}$ ________ h. $\frac{5}{8^{^-1}}$

3. Calculate.

________ a. $(8 - 5)^3$ ________ b. $100(4)^3$ ________ c. $^-3^3 + 4^2$

________ 4. Apply both the distributive and power properties to simplify:

$y^4(6y^2 + 3y - 2)$

(Go on to the next page.)

________ 5. A coin is tossed 5 times. One possible result is H T H H T. How many different sequences of H's and T's are possible?

________ 6. Place a <, =, or > sign in the blank to make a true statement.

a. $(^{-}2)^4$ ______ $(^{-}2)^9$

b. 12^5 ______ 11^5

________ 7. Kris has 5 blouses, 7 skirts, and 4 pairs of shoes. How many blouse-skirt-shoe outfits does she have?

8. Suppose w = 2 and x = 4. Calculate:

________ a. $\frac{w^3 + x^2}{3}$

________ c. $5 + 2(x + w)^2$

________ b. $8 - x^2$

________ d. $-w^6$

9. Suppose you invest $30 at 6% yearly interest, and keep the interest in the account.

________ a. How much will you have after 2 years?

________ b. How much will you have after t years?

10. Tell why 3^{-456} is not a negative number.

ANSWER KEY

Chapter 10, Quiz 1 *(10 points)*

(3) 1. a. 81 b. 6.76 c. $^{-}64$

(3) 2. a. 160 b. $^{-}19$ c. 1991 *(1)* 3. 1728 words

(2) 4. a. $42 b. $(1.05)^n \cdot \$40$ *(1)* 5. 168 outfits

Chapter 10, Quiz 2 *(10 points)*

(6) 1. $4a^3b^7$ 2. 9 3. $24m^7n^3$ 4. $12x^9y^5$ 5. 1 6. 2

(2) 7. a. $\frac{9}{25}$ of light b. $(\frac{3}{5})^n$ of light

(2) 8. a. $220.50 b. $200

Chapter 10 Test *(50 points)*

(6) 1. a. $\frac{1}{81}$ b. $^{-}125$ c. 32

(16) 2. a. 2 b. 128 c. $15x^6y^3$ d. $\frac{1}{27}$ e. 128 f. $4a^5b^5$

g. 3 h. 40 *(6)* 3. a. 27 b. 6400 c. $^{-}11$

(4) 4. $6y^6 + 3y^5 - 2y^4$ 5. 32 different sequences

(2) 6. a. > b. > *(2)* 7. 140 outfits

(8) 8. a. 8 b. $^{-}8$ c. 77 d. $^{-}64$

(4) 9. a. about $33.71 b. $\$30(1.06)^t$

(2) 10. $3^{-456} = 1/(3^{456})$, which is the reciprocal of a positive number, so it is positive.

Chapter 11 - Operations with Powers

Lesson 1: Adding Powers, pp. 484 - 487

Objective: To add expressions involving sums of powers of the same variable.

Comments: Read T11-1 through T11-4.

Students should be able to read the lesson and answer the QCR on their own.

You may want to introduce the following expressions: terms, like terms, and unlike terms. For example: $5x^2$, $4x^3$, and $3x^2$ are terms; $5x^2$ and $4x^3$ are unlike terms; and $5x^2$ and $3x^2$ are like terms. Tell students that only like terms can be combined. Here are more examples:

1) $6a^2 - a^2 = 5a^2$
2) $y^5 + 2y^3 + 3y^5 = 4y^5 + 2y^3$
3) $8x^9 - 9x^9 = {}^-1x^9$

Be sure to have the students discuss QER #5 - 8. Remind them that we can check the simplification of an expression in one or more variables by substituting real numbers for the variable(s).

Suggested Assignments:
1) QCR
2) QER: #5 - 9, 12 - 20

Lesson 2: Polynomials, pp. 488 - 493

Objectives:
1) To identify the degree of a polynomial.
2) To identify the coefficient of each term of a polynomial.
3) To add polynomials.

Comments: Read T11-5 and T11-6.

Read through the lesson with the students. It is recommended that you show the students step by step how the amounts of money were obtained for Mary's 14th, 15th, and 16th birthdays. For example, show the students that by Mary's 14th birthday she had $[50(1.07) + 50]\,1.07 + 50$ dollars which is equal to $50(1.07)^2 + 50(1.07) + 50$.

ORAL PRACTICE

It is important to provide the students with oral practice in identifying the degree of a polynomial and the coefficients of its terms. For example, you may want to ask students to do the following exercises.

1. Find the degree of each polynomial.

   a. $5x^2 + 3x - 7$
   b. $3.8y^6 - 8.5y^{10} + 15y - 6$
   c. $17w^5 + 8w^3 + 2w^8 + 3w$

2. Find the coefficient of each term in the polynomials in exercise 1.

Be sure to emphasize that the terms, x^5, x^3, and x^2, in the polynomial, $x^6 + x^4 - 1$, have 0 for their coefficients.

You may want to do some of the QCR as a class.

Suggested
Assignments:
1) QCR: #1, 3, 5, 6 - 27
2) QTU: #1 - 12, 15 - 20
3) QTU: #24 - 28, Supplementary Worksheet 1

QUIZ 1 Anytime after Lesson 2

Lesson 3: Dividing Powers, pp. 494 - 499

Objective: To apply the Division of Powers Theorem to simplify expressions.

Comments: Read T11-7.

Students should realize that the Division of Powers Theorem is just a shortcut method for simplifying expressions. For example, an expression like x^5/x^2 can be simplified in two ways:

$$1)\ \frac{x^5}{x^2} = \frac{x \cdot x \cdot x \cdot x \cdot x}{x \cdot x} = \frac{x}{x} \cdot \frac{x}{x} \cdot \frac{x \cdot x \cdot x}{1}$$
$$= 1 \cdot 1 \cdot x \cdot x \cdot x$$
$$= x^3$$

$$2)\ \frac{x^5}{x^2} = x^{5-2} = x^3$$

Remind students that the Division of Powers Theorem only applies when the bases are same. The Theorem cannot be used to simplify expressions such as $\frac{4^3}{3^5}$ or $\frac{5^7}{2^7}$.

Suggested
Assignments:
1) QCR: #1 - 28
2) QAR: #1 - 8, 13 - 20

Lesson 4: Powers of Powers, pp. 500 - 503

Objective: To apply the Power of Powers Theorem to help simplify expressions.

Comments: Read T11-8.

Students should be able to read the lesson and do the QCR on their own.

Students should realize that the Power of a Power Theorem is just a shortcut rule for simplifying expressions such as $(x^5)^7$ and $(y^{-9})^8$.

Some students may have difficulty simplifying expressions such as $^-3(a^2)^4$ and $((3^5)^4)^3$. You may have to remind them about the rule for working with powers that was discussed in Lesson 3 of Chapter 10.

Suggested Assignments:
1) QCR
2) QAR: #1 - 21

QUIZ 2 Anytime after Lesson 4

Lesson 5: Powers of Products and Quotients, pp. 504 - 510

Objective: To simplify expressions involving the powers of products or quotients.

Comments: Read T11-9.

Students should realize that the Power of a Product Theorem is just a shortcut rule for simplifying expressions such as $(^-4y)^3$ and $(2.3 \cdot 10^8)^3$.

Discuss the second example on page 505 and other similar problems as a class. Be sure to ask questions such as:

---What was the problem?
---What information was given?
---What were you to find?

Suggested Assignments:
1) QCR: #1 - 32
2) QTU: #1 - 6, 13 - 20
3) QTU: #7 - 12, 21 - 26, 31 - 33

Lesson 6: Scientific Notation (OMIT)

Chapter Summary

Comments: Have students read and discuss the summary.

Chapter 11 Test

Chapter 11
Supplementary Worksheet 1

Name ____________________

Date ____________________

Simplify.

1. $(3x^2 + 3x - 6) + (7x^2 + 5x + 8)$ ____________________

2. $(y^2 + 3y + 2) - (y^2 - 4y + 1)$ ____________________

3. $(2b^3 - 4b) - (b^2 - 3b + 5)$ ____________________

4. $(m^2 - 10m + 5) + (9m^2 - 10m - 3)$ ____________________

5. $(w^3 - 1) + (w^2 - 2w + 7)$ ____________________

6. $(4n^2 - 8) - (2n^2 - 5n + 10)$ ____________________

7. $(5x^2 + 3x - 7) + (4x^2 - 5x + 8)$ ____________________

8. $(3a^2 - 4a + 5) - (a^2 - 4a + 1)$ ____________________

9. $(9p^2 - 6p + 3) + (6p - 5)$ ____________________

10. $(8t^2 - 4) - (5t^2 + 6t - 2)$ ____________________

Chapter 11 Name ____________________

Quiz 1 (Lessons 1 - 2) Date ____________________

1. Simplify as much as possible.

   a. $4b^8 + 6b^8 - 5b^6$

   b. $(2x^2 - x + 7) + (5x^2 + 10x - 12)$

   c. $8y + 10y^2 - 6y + 8$

   d. $(9p^5 + 4p^4 - 6p^3 + 11p + 8) + (6p^4 - 8p^3 + 2p^2 + 10)$

2. Wesley received the following cash presents for Christmas:

Year	Amount Received
in 1977	\$25
in 1978	\$50
in 1979	\$45

If he had invested all his money into an account with a scale factor x, how much would he have had by Christmas:

   a. in 1978.

   b. in 1979.

3. For the polynomial $15x^4 + 12x^3 - 8x^2 + 7x - 9$

   a. Give the coefficient of x^2.

   b. Give the degree of the polynomial.

4. Use the distributive property to help simplify.

   a. $3y^5 + 2(4y^3 + 7y^5)$

   b. $8(w^7 + w^{10}) + 5(w^{10} - w^7)$

Chapter 11

Quiz 2 (Lessons 3 - 4)

Name ____________________

Date ____________________

For problems 1-4, you are to:

(a) Write without fractions.

(b) *If* your answer to part (a) has negative exponents, rewrite the answer so that there are fractions but no negative exponents.

(a) ________ 1. $\frac{x^{5}w^{8}}{x^{10}w^{5}}$

(b) ________

(a) ________ 3. $y^{-8} \div y^{-4}$

(b) ________

(a) ________ 2. $\frac{4m^{6}}{\frac{1}{3}m^{9}}$

(b) ________

(a) ________ 4. $\frac{3^{8}a^{7}b^{3}}{3^{6}a^{4}b}$

(b) ________

Simplify.

________ 5. $(3^{2})^{3}$

________ 7. ${}^{-}3(w^{2})^{5}$

________ 6. $(x^{-4})^{2} \div (x^{-3})^{4}$

________ 8. $6v^{4} \cdot 5(v^{3})^{8}$

9. $2^{10} \approx 10^{3}$. Use this information to approximate.

________ a. 2^{40}

________ b. 2^{120}

Chapter 11 Test

Name ____________________

Date ____________________

Simplify as much as possible.

_______ 1. $6y^5 + 4y^5 - 3y^5$

_______ 2. $(5x^6)^2 + 2(x^3)^4$

_______ 3. $(4x^2 - 3x + 7) + (8x^2 + 9x - 4)$

_______ 4. $6(m^0)^3 \cdot (2x)^2$

_______ 5. $2x - 5y^2 + 4y^2 - x^2$

_______ 6. $8t^3 + 4t^2 + 3t + 9 - (3t^2 + 3t + 6)$

7. Suppose Mae received the following cash presents on her birthdays:

Year	Amount Received
1977	$20
1978	$25
1979	$40
1980	$50

If she had invested all money into an account with a scale factor Y, how much would she have had by her birthday:

_____ a. in 1978 _____ b. in 1979 _____ c. in 1980

8. Rewrite each expression without using parentheses.

_________ a. $(2x)^{-4}$ _________ c. $\frac{1}{2}(4p)^2$

_________ b. $(^-5m)^3$ _________ d. $(\frac{k}{3})^3$

(Go on to the next page.)

Chapter 11 Test - Page 2

_____ 9. Persons A and B have the following amounts of money:

A. $40m^5 + 30m^4 + 10m^3 + 5m + 10$

B. $9m^3 + 20m^2 + 12m + 60$

A and B together have __?__ amount of money.

_____ 10. What happens to the area of a circle if its radius is multiplied by 5?

11. (1) Write each expression without fractions.
(2) If your answer to part (1) has negative exponents, rewrite the answer so that there are fractions but no negative exponents.

(1)_____ a. $\dfrac{2w^{10}}{\frac{1}{3}w^4}$ (1)_____ b. $\dfrac{4^9c^4d^8}{4^7c^6d^4}$ (1)_____ c. $\dfrac{3x^5}{8y^2} \cdot \dfrac{8y^9}{15x}$

(2)_____ (2)_____ (2)_____

12. Use the distributive property to help simplify.

_________ a. $5x^3 + 2(3x^3 + x^5)$

_________ b. $3(y^2 + y) - (3y^2 + 2y)$

13. For the polynomial $5x^4 - 3x^3 + 6x - 9$

_________ a. Give the degree of the polynomial.

_________ b. Give the coefficient of x.

_________ c. Give the coefficient of x^2.

_____ 14. $(1.08)^9 \approx 2$. Use this information to approximate $(1.08)^{36}$.

_____ 15. A 12" pizza is how many times bigger than a 6" pizza with the same thickness?

_____ 16. Give the value of $4n^3 + 2n^2 - 3n + 4$ when $n = {}^{-}1$.

_____ 17. Write as a power of a number in parentheses: $36w^2x^4$.

ANSWER KEY

Chapter 11, Supplementary Worksheet 1

1. $10x^2 + 8x + 2$ 2. $7y + 1$ 3. $2b^3 - b^2 - b - 5$

4. $10m^2 - 20m + 2$ 5. $w^3 + w^2 - 2w + 6$ 6. $2n^2 + 5n - 18$

7. $9x^2 - 2x + 1$ 8. $2a^2 + 4$ 9. $9p^2 - 2$ 10. $3t^2 - 6t - 2$

Chapter 11, Quiz 1 *(10 points)*

(4) 1. a. $10b^8 - 5b^6$ c. $10y^2 + 2y + 8$

b. $7x^2 + 9x - 5$ d. $9p^5 + 10p^4 - 14p^3 + 2p^2 + 11p + 18$

(6) 2. a. $25x + 50$ 3. a. $^-8$ 4. a. $17y^5 + 8y^3$

b. $25x^2 + 50x + 45$ b. 4 b. $3w^7 + 13w^{10}$

Chapter 11, Quiz 2 *(10 points)*

(4) 1. a. $x^{-5}w^3$ 2. a. $12m^{-3}$ 3. a. y^{-4} 4. a. $3^2a^3b^2$ or $9a^3b^2$

b. $\frac{w^3}{x^5}$ b. $\frac{12}{m^3}$ b. $\frac{1}{y^4}$ b. ———

(4) 5. $3^6 = 729$ 6. $x^{-8} + x^{-12}$ or $\frac{1}{x^8} + \frac{1}{x^{12}}$ 7. $^-3w^{10}$ 8. $30v^{28}$

(2) 9. a. $10^{12} = 1{,}000{,}000{,}000{,}000$ b. $10^{36} = 1{,}000,\ldots 000$ (36 zeros)

Chapter 11 Test *(50 points)*

(12) 1. $7y^5$ 2. $27x^{12}$ 3. $12x^2 + 6x + 3$ 4. $24x^2$

5. $2x - y^2 - x^2$ 6. $8t^3 + t^2 + 3$

(6) 7. a. $20y + 25$ b. $20y^2 + 25y + 40$ c. $20y^3 + 25y^2 + 40y + 50$

(8) 8. a. $\frac{1}{16x^4}$ b. $^-125m^3$ c. $8p^2$ d. $\frac{k^3}{27}$

(2) 9. $40m^5 + 30m^4 + 19m^3 + 20m^2 + 17m + 70$

(2) 10. The area is 25 times the area of the original circle.

(6) 11. a. 1) $6w^6$ b. 1) $16c^{-2}d^4$ c. 1) $5^{-1}x^4y^7$

2) ——— 2) $\frac{16d^4}{c^2}$ 2) $\frac{x^4y^7}{5}$

(Go on to the next page.)

Chapter 11 Answer Key - Page 2

(4) 12. a. $11x^3 + 2x^5$

b. y

(3) 13. a. 4

b. 6

c. 0

(6) 14. 16

15. 4 times bigger

16. 5

(1) 17. $(6wx^2)^2$

Chapter 12 - Squares and Square Roots

Lessons 1 - 5: OMIT

Lessons 6: Multiplying Binomials, pp. 547 - 550

Objective: To multiply binomials.

Vocabulary: binomial, trinomial

Read T12-1 through T12-4 and T12-10.

Tell students that it is easy to remember the terms, binomial and trinomial, if they compare them with words they already know. A binomial is an expression with two terms just as a bicycle has two wheels. A trinomial is an expression with three terms just as a tricycle has three wheels.

Discuss the physical models for multiplying a binomial by a single number and for finding the product of two binomials. (An overhead transparency master of the area pieces is provided.)

The FOIL method provides a short way to find the product of two binomials. After some practice, students will find it easy to multiply binomials.

Suggested Assignments:
1) QCR: #1 - 5
2) QCR: #6 - 31

Lesson 7: Arithmetic Shortcuts, pp. 553 - 557

Objectives:
1) To write the square of a binomial as a polynomial.
2) To use shortcuts to multiply and to square numbers.

Comments: Read T12-11 and T12-12.

On the first day of this lesson, you may want to have the students read pages 553 - 556 and do the first assignment. Remind students that they should use Shortcut 1 to do the QCR #1 - 15. (They are NOT to multiply the numbers as they are!) They should also use a shortcut to do #37 - 40.

On the second day, the reading and the first assignment could be discussed. Then have the students do the second assignment.

Be sure to remind students that they can check their answers for QCR #16 - 35 by substituting real numbers for the variables. (See the example on page 548.)

Suggested Assignments:
1) QCR: #1 - 15, #36 - 40
2) QCR: #16 - 33, 41 - 44; QE #1 - 2

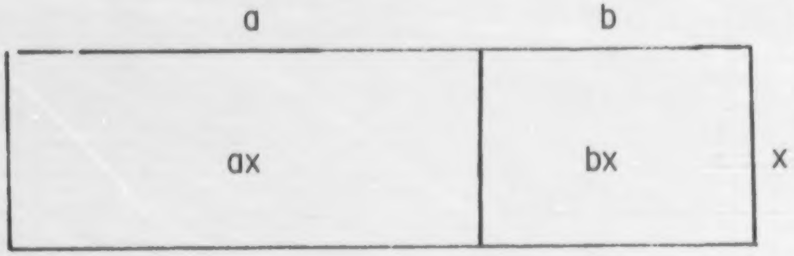
Lessons 8 - 9 and Chapter Summary: OMIT

Chapter 12 Test

Distributive Property

$(a + b)x = ax + bx$

Length-area picture for the distributive property

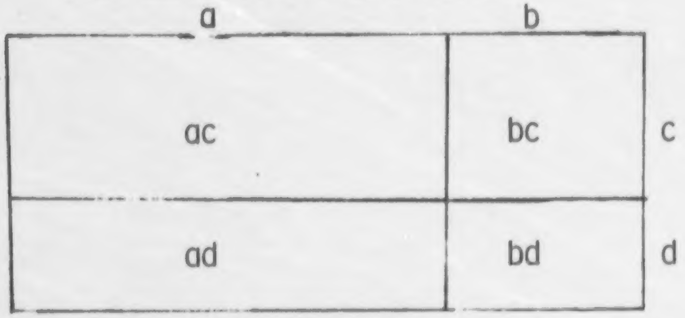


$$\begin{aligned}\text{Area} &= (a + b)x \\ &= ax + bx\end{aligned}$$

Product of two binomials

$$\begin{aligned}(a + b)(c + d) &= a(c + d) + b(c + d) \\ &= ac + ad + bc + bd\end{aligned}$$

Length-area picture for the product of two binomials



$$\begin{aligned}\text{Area} &= (a + b)(c + d) \\ &= ac + ad + bc + bd\end{aligned}$$

Chapter 12 Test

Name ____________________

Date ____________________

Apply the FOIL Theorem.

________ 1. $(x + 7)(x + 3)$

________ 2. $(w - 9)(w + 6)$

________ 3. $(4 - 2a)(3 - 5a)$

________ 4. $(5n + 6)(n - 1)$

________ 5. $(m - 8)(m - 10)$

________ 6. $(w + x)(w + x)$

Write as a polynomial.

________ 7. $(y + 8)^2$

________ 8. $(3x - 7)(3x + 7)$

________ 9. $5(n - 4)^2$

________ 10. $(4 + x)(4 - x)$

11. Let $X = 5c - 2d$, $Y = 3c + 4d$, and $W = 4c$.

Calculate:

________ a. XY

________ b. $W(X + Y)$

________ 12. $30^2 = 900$ so $31^2 = \underline{\ \ ?\ \ }$
(Use a shortcut to find the answer.)

________ 13. Find the square of 1.04 without multiplying 1.04 by itself.

ANSWER KEY

Chapter 12 Test *(30 points)*

(6) 1. $x^2 + 10x + 21$ 2. $w^2 - 3w - 54$ 3. $12 - 26a + 10a^2$

(6) 4. $5n^2 + n - 6$ 5. $m^2 - 18m + 80$ 6. $w^2 + 2wx + x^2$

(8) 7. $y^2 + 16y + 64$ 8. $9x^2 - 49$ 9. $5n^2 - 40n + 80$ 10. $16 - x^2$

(6) 11. a. $15c^2 + 14cd - 8d^2$ b. $32c^2 + 8cd$

(4) 12. 961 13. 1.0816

Chapter 16 - Functions

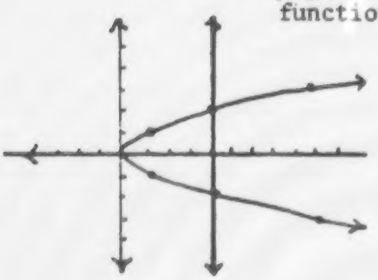
Lesson 1: The Definition of Function, pp. 690 - 694

Objectives:
1) To identify functions.
2) To name ordered pairs of functions.
3) To complete arithmetic and geometric sequences.

Vocabulary: function, arithmetic and geometric sequences

Comments: Read T16-1 through T16-4.

Functions can be described by a graph, by a written rule, by a list of ordered pairs, or by an equation. Be sure to discuss many examples of functions and nonfunctions with the students. A transparency master of the graphs shown on page 690 and a master of other examples of functions and nonfunctions are provided.



NOT a function since the line passes through more than one point of the graph.

You may want to introduce the Vertical Line Test for a Function:

> If any vertical line passes through no more than one point of the graph, then the set of ordered pairs graphed is a function.

Illustrate the test for your class using the graphs on the blackboard and a meter stick (or graphs on the overhead projector and a pencil).

Supplementary Worksheet 1 for this lesson introduces the students to arithmetic and geometric sequences as well as provides more practice in naming ordered pairs of functions. Be sure to have students discuss how they obtained their results.

Suggested Assignments:
1) QCR
2) QER, Supplementary Worksheet 1

Lesson 2: Function Notation, pp. 695 - 698

Objective: To use functional notation.

Vocabulary: elements of the function

Comments: Read T16-5.

$f(x)$

The f(x) notation should be new to most students. Be prepared for some confusion since up to this point the symbols used by students were either variables, numbers, or operations. Some students may confuse f(x) for multiplication.

Be sure to emphasize to the students that "f(x)" is just a shortcut notation for "function of x."

HISTORY You may want to tell students about Leonard Euler (1707-1783), a Swiss mathematician, who made many contributions to mathematics. Among his contributions was the notation f(x) to represent the value of a function.

Note that the exercises for composite functions have not been recommended for this course.

Suggested Assignments: 1) QCR, QTU: #1 - 6

QUIZ 1 Anytime after Lesson 2

Lesson 3: Linear Functions, pp. 699 - 704

Objectives:
1) To find the domain and the range of a function.
2) To graph linear functions.

Vocabulary: linear function, domain, range

Comments: Read T16-6.

Read through the lesson with the students. The discussion on the domain of a function may be difficult for some students to understand on their own.

Remind students that the domain and range are sets of numbers, not sets of ordered pairs.

Suggested Assignments:
1) QCR: #1 - 20
2) QER: #1 - 15

QUIZ 2 Anytime after Lesson 3

Lesson 4: Absolute Value Functions, pp. 705 - 708 (OMIT)

Lesson 5: Quadratic and Other Functions, pp. 709 - 712

Objective: To graph and interpret quadratic, exponential, and power functions.

Vocabulary: quadratic function, hyperbola, parabola, exponential function, polynomial function, power function

Comments: Read T16-8.

Review the examples discussed in this lesson as a class. (Transparency masters of the examples are provided.) Be sure to spend time on the example of an exponential function shown on pages 710 - 711. The exponential function was discussed in a lesson that was omitted for this course.

Ask students to make tables of ordered pairs before graphing the functions in QCR: #3 - 8 and QTU: #5 - 12. You may want to provide the students with graph sheet B to do these exercises.

Suggested Assignments:
1) QCR: #1, 2, 3, 5, 7, 9, 10, QE: #1
2) QCR: #4, 6, 8, QTU: #1 - 6
3) QTU: #7 - 12

Lessons 6 - 8: OMIT

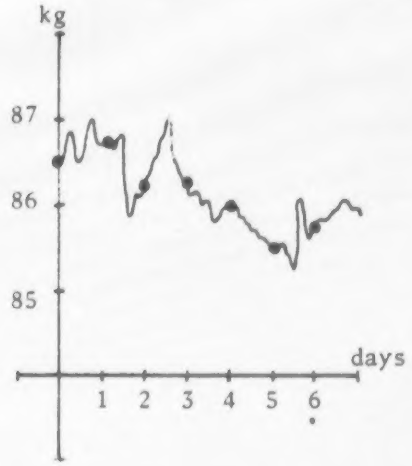
Chapter Summary

Comments: Have students read and discuss the Chapter Summary.

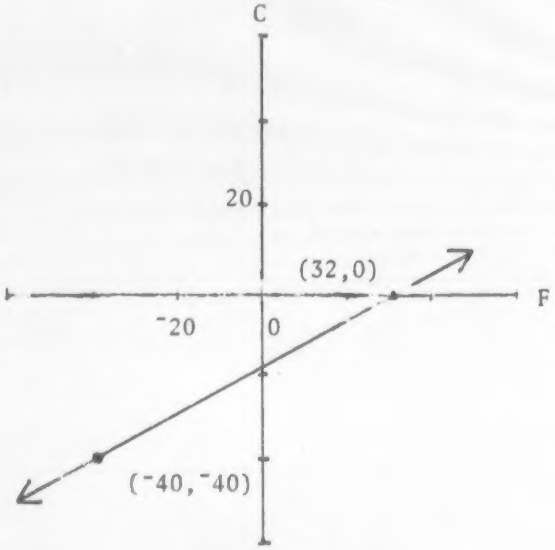
Chapter 16 Test

Chapter 16, Lesson 1
Transparency 1

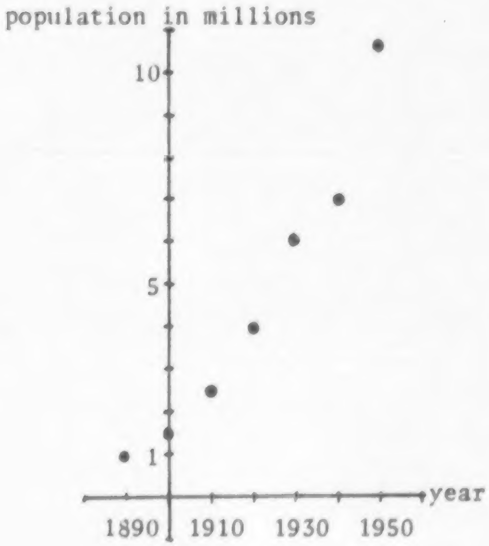
(A) Horace Heavy's weight



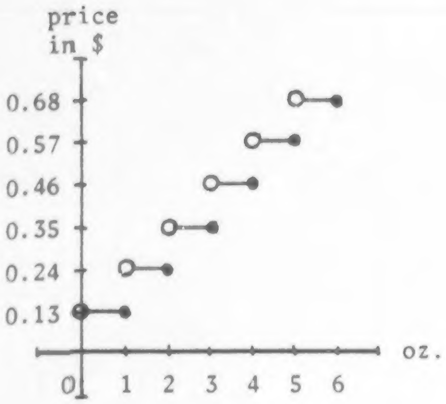
(B) F-C relationship



(C) Population of California

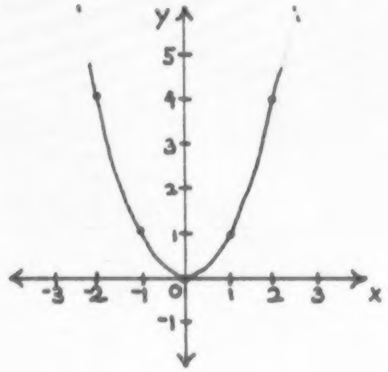


(D) Cost of mailing

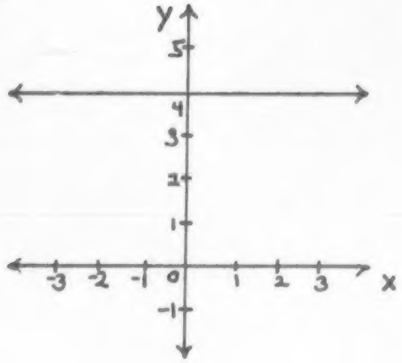


Chapter 16, Lesson 1
Transparency 2

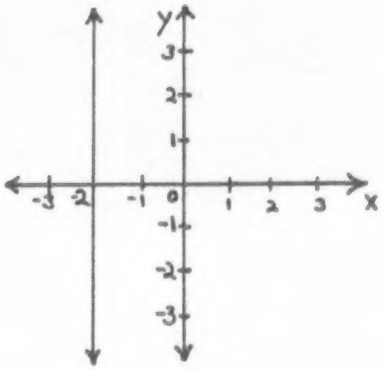
1.



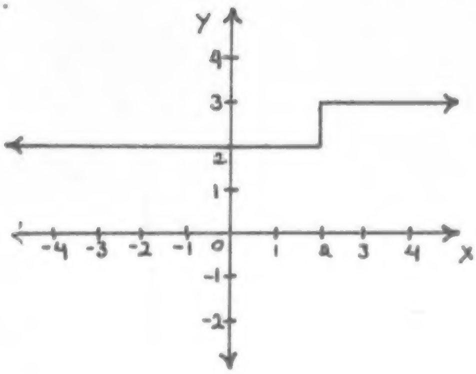
2.



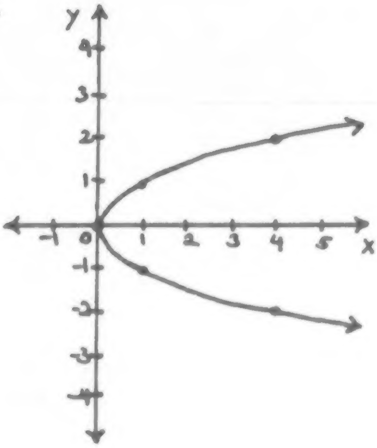
3.



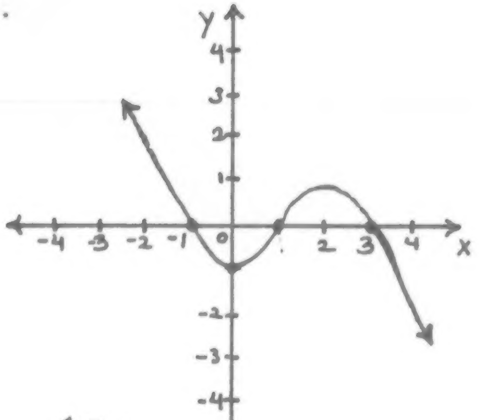
4.

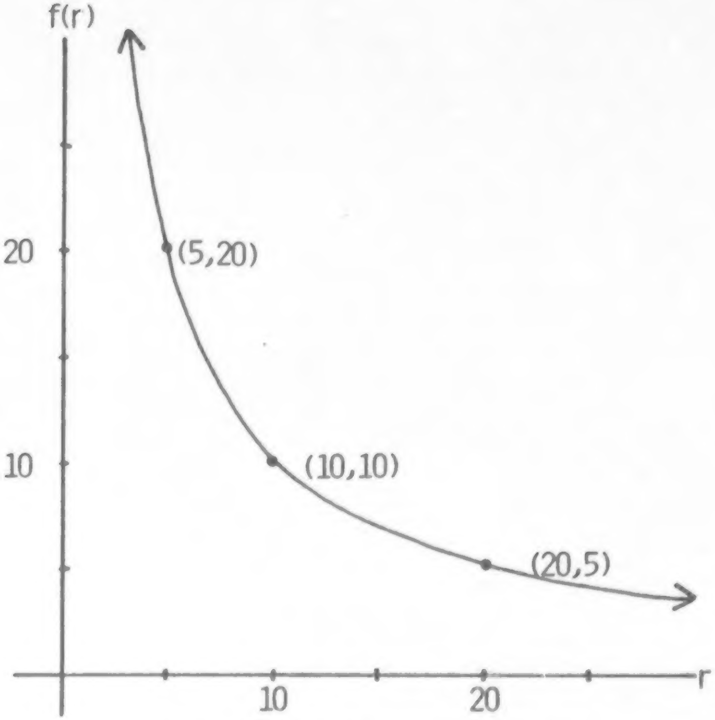


5.



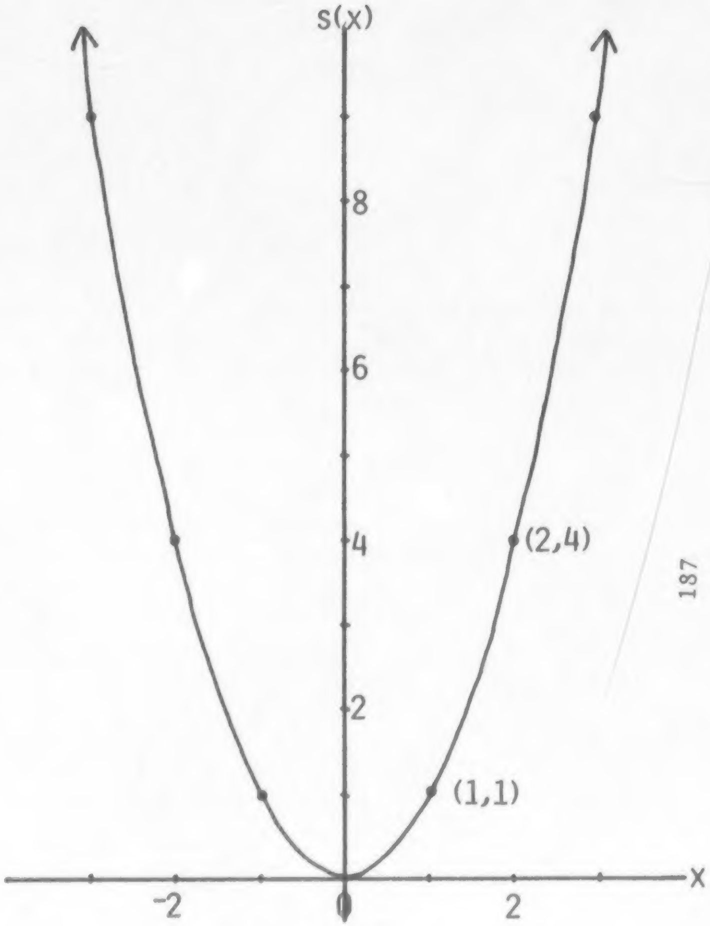
6.





rate and time to travel 100 miles

$f(r) = \frac{100}{r}$



squaring function

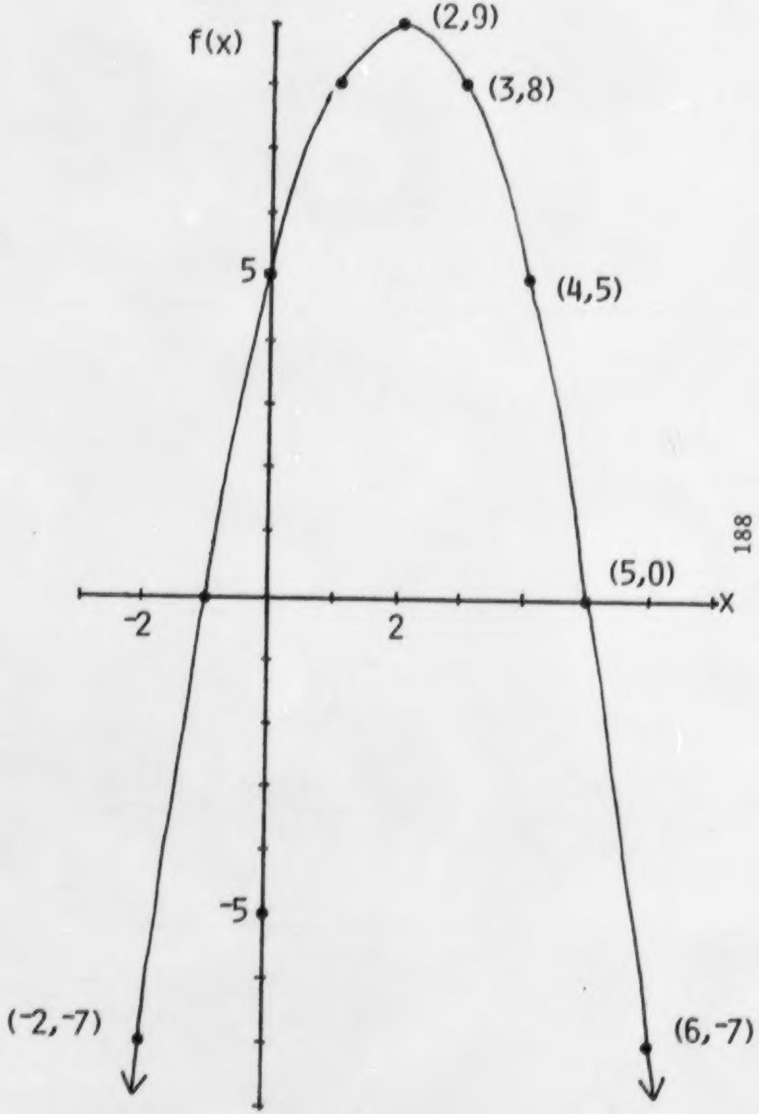
$s(x) = x^2$

Chapter 16, Lesson 5
Transparency 1

$f(x) = {}^{-}x^2 + 4x + 5$

Some ordered pairs:

x	$f(x)$
$^{-}2$	$^{-}7$
$^{-}1$	0
0	5
1	8
2	9
3	8
4	5
5	0
6	$^{-}7$



Chapter 16, Lesson 5
Transparency 2

$f(x) = 2^x$

Some points of f are:

$(1,2)$

$(0,1)$

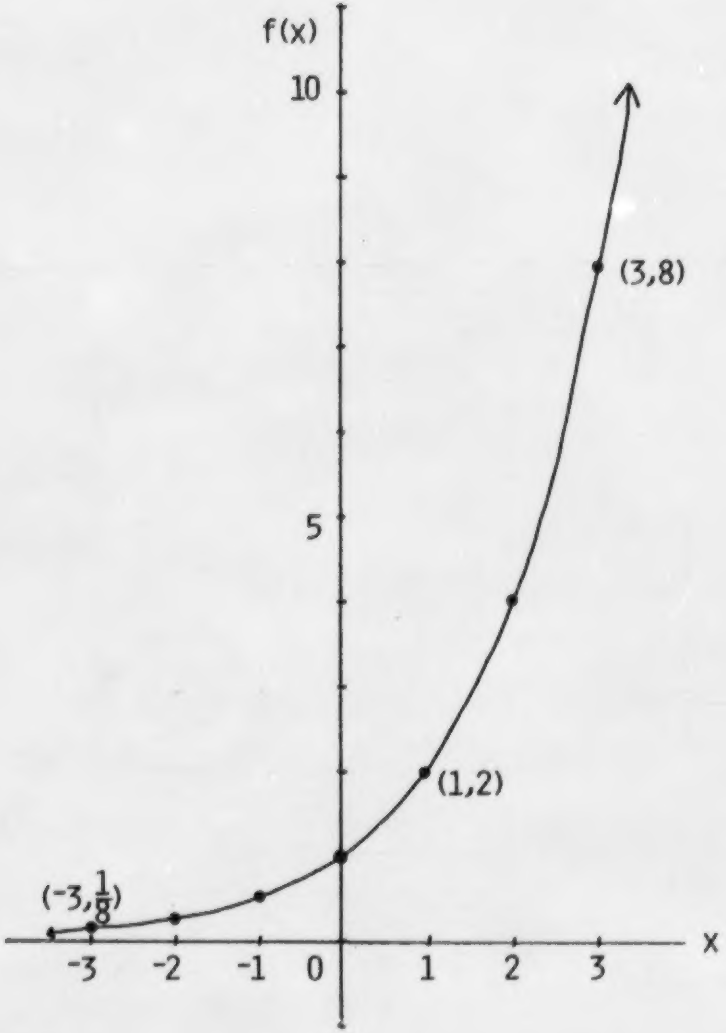
$(^-1,\frac{1}{2})$

$(^-2,\frac{1}{4})$

$(^-3,\frac{1}{8})$

$(2,4)$

$(3,8)$



Chapter 16, Lesson 5
Transparency 3

Chapter 16, Lesson 1
Supplementary Worksheet 1

Name______________________________

Date______________________________

1. Complete each table below. The first line in each table is given and you are to use the equation to find the corresponding numbers of the second line.

a. $y = x + 3$

x	0	1	2	3	4
y					

b. $y = 4x$

x	0	1	2	3	4
y					

c. $y = 2x + 3$

x	0	1	2	3	4
y					

d. $y = 5x - 2$

x	0	1	2	3	4
y					

e. $y = x^2$

x	0	1	2	3	4
y					

f. $y = x^2 - 3$

x	0	1	2	3	4
y					

g. $y = x^3$

x	0	1	2	3	4
y					

2. The line of numbers you wrote for y in exercise 1b should be:

y 0 4 8 12 16

These numbers are part of an arithmetic sequence. An arithmetic sequence is a number sequence that is built by always adding the same number to the previous number. The sequence above is found by adding 4 to the previous number.

Complete the following arithmetic sequences:

a. 0 4 8 12 16 _____ _____

b. 5 14 23 _____ _____

c. 9 12 _____ 18 _____

d. _____ _____ 54 61 68

3. Refer to your answers in Exercise 1. In which table(s) are the numbers on the second line in arithmetic sequence?

4. A geometric sequence is a number sequence that is built by multiplying a term of the sequence by a certain number to find the next term. For example, the sequence below is an example of a geometric sequence:

2 4 8 16 . . .

Each number can be found by multiplying the previous number by 2.

Complete the following geometric sequences:

a. 1 4 16 _____ _____

b. 3 24 _____ 1536 _____

c. 5 _____ _____ 135 405

d. _____ _____ 28 56 112

Chapter 16 Name ______________________________

Quiz 1 (Lessons 1 - 2) Date ______________________________

1. Tell whether the set of ordered pairs is a function.

________ a. $\{(1, 5), (2, {}^-8), (7, 6), ({}^-8, 3)\}$

________ b. $\{({}^-2, 4), (5, 8), (9, 2), (10, 4)\}$

2. Each equation describes a function. Name four ordered pairs of the function.

(1) ______ a. $y = 6x - 3$ (1) ______ b. $y = 3x^2$

(2) ______ (2) ______

(3) ______ (3) ______

(4) ______ (4) ______

3. Consider the function h with rule $h(x) = 4x + 5$. Fill in the blank to make a true statement.

a. $h(5) =$ _____.

b. When $x = {}^-4$, $h(x) =$ _____.

4. Complete the following sequences.

a. 2 6 18 ____ ____

b. 12 ____ ____ 30 36

Chapter 16 Name ____________________

Quiz 2 (Lesson 3) Date ____________________

1. What is the domain and range of each function?

   a. $\{(6, 4), ({}^{-}3, 5), (2, 1), (7, {}^{-}3)\}$

      (1) domain: ____________________

      (2) range: ____________________

   b. g, where $g(x) = 2x + 3$

      (1) domain: ____________________

      (2) range: ____________________

2. Suppose f is a function such that $f(x) = 2x - 3$.

   a. Graph the function on Figure A (on the next page) if the domain is $\{0, 1, 2, 3, 4\}$.

   b. Graph the function on Figure B (on the next page) if the domain is the set of real numbers.

3. Find an equation for each linear function:

__________ a. c, where $c(x)$ is the cost of x 15¢ stamps.

__________ b. w, where $w(c)$ is the weight of a crate of canteloupes if the crate weighs 10 kg when empty and canteloupes weigh 0.8 kg each.

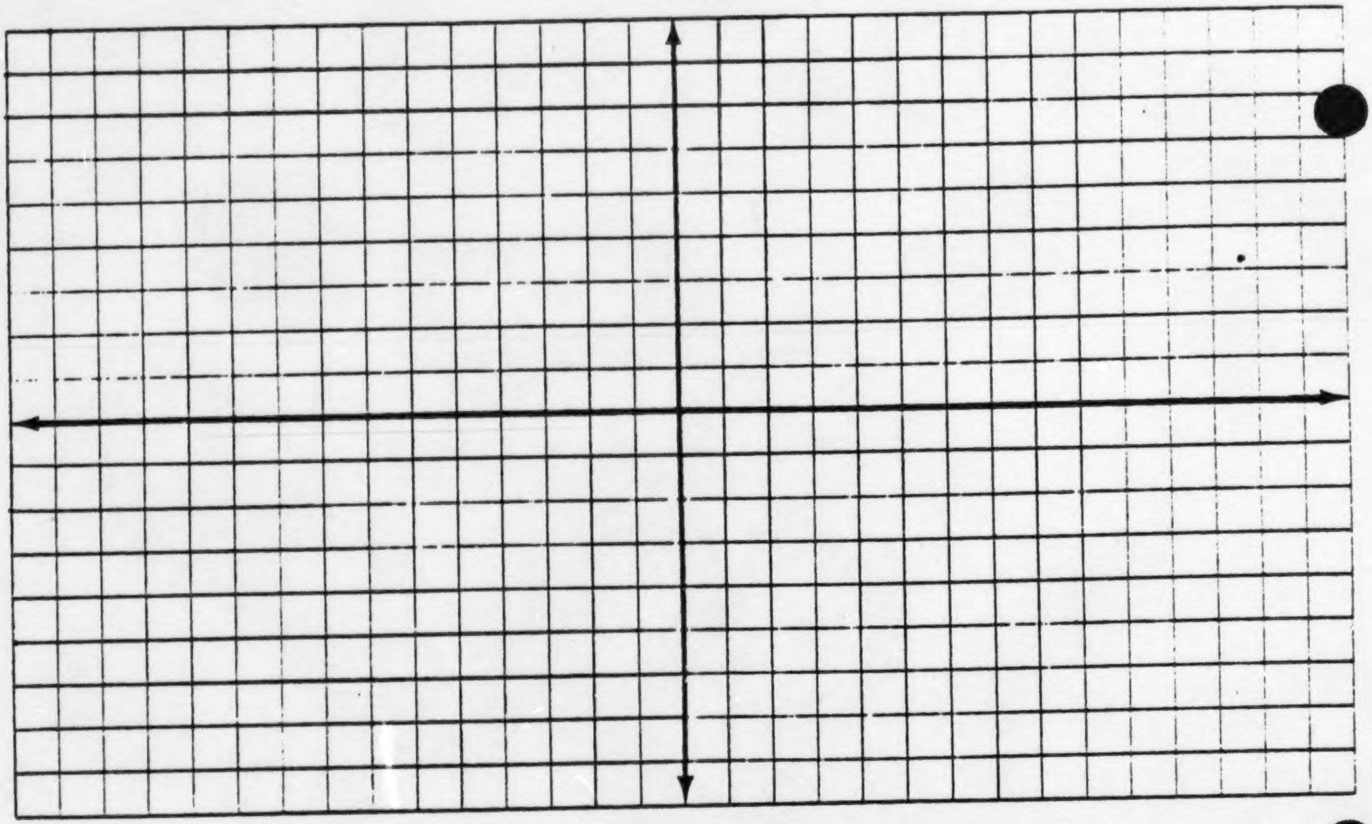


Figure A

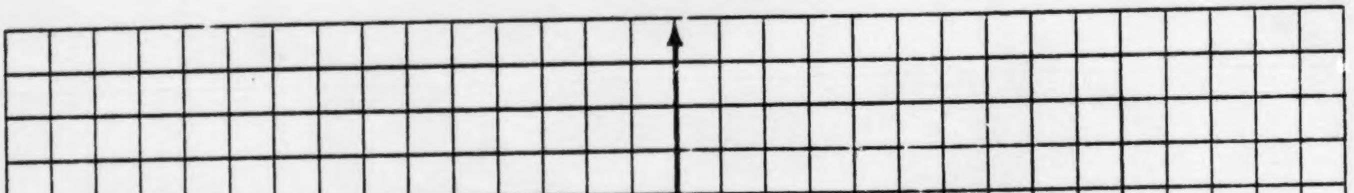


Figure B

Chapter 16 Test

Name __________________________

Date __________________________

1. Each equation describes a function. Name four ordered pairs of the function.

(1) __________ a. $y = 5x - 3$ (1) __________ b. $xy = 24$

(2) __________ (2) __________

(3) __________ (3) __________

(4) __________ (4) __________

2. Give the domain and range of each function below.

__________ a. {(2, $^-8$), (5, 7), (6, 10), (1, 4)}

____

__________ b. h where $h(x) = 7x - 2$ where x can be any integer

____

__________ c. {(1, 5), (4, 3), (2, 8), (0, 9)}

____

3. Consider the function k with rule $k(x) = 2x - 5$. Then,

__________ a. $k(4) =$ ___?___

__________ b. $k(10) =$ ___?___

__________ c. When $x = {}^-3$, $k(x) =$ ___?___

d. Graph the function on Figure A (of the graph sheet) if the domain is the set of real number.

__________ e. What kind of function is k?

4. Tell whether the set of ordered pairs is a function.

__________ a. {(2, $^-6$), (8, 1), (3, 7), (9, 1), ($^-6$, 2)}

__________ b. {(4, 2), (4, 5), (4, 8), (4, 10)}

__________ c. {(1, 5), (0, 2), (6, 4), ($^-3$, 0)}

(Go on to the next page.)

5. Complete the following sequences:

a. 1 5 25 ___ ___

b. 3 9 15 ___ 27 ___

c. ___ ___ 36 44 52

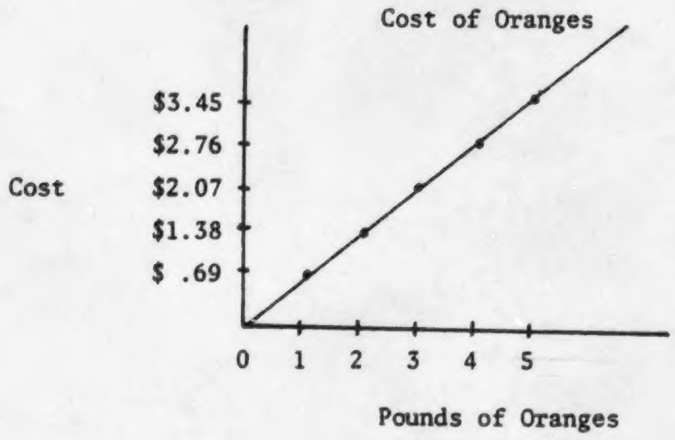
6. Graph the function, $f(x) = 2x + 1$, on Figure B (of the graph sheet) if the domain is $\{0, 1, 2, 3\}$.

___________ 7. Give an example of a set of ordered pairs which is not a function.

8. Graph the function with the given equation on Figure C: $y = x^2 + 2x - 7$.

9. Graph the function with the given equation on Figure D: $y = \frac{1}{x}$.

___________ 10. Give a written rule for the function whose graph is shown.



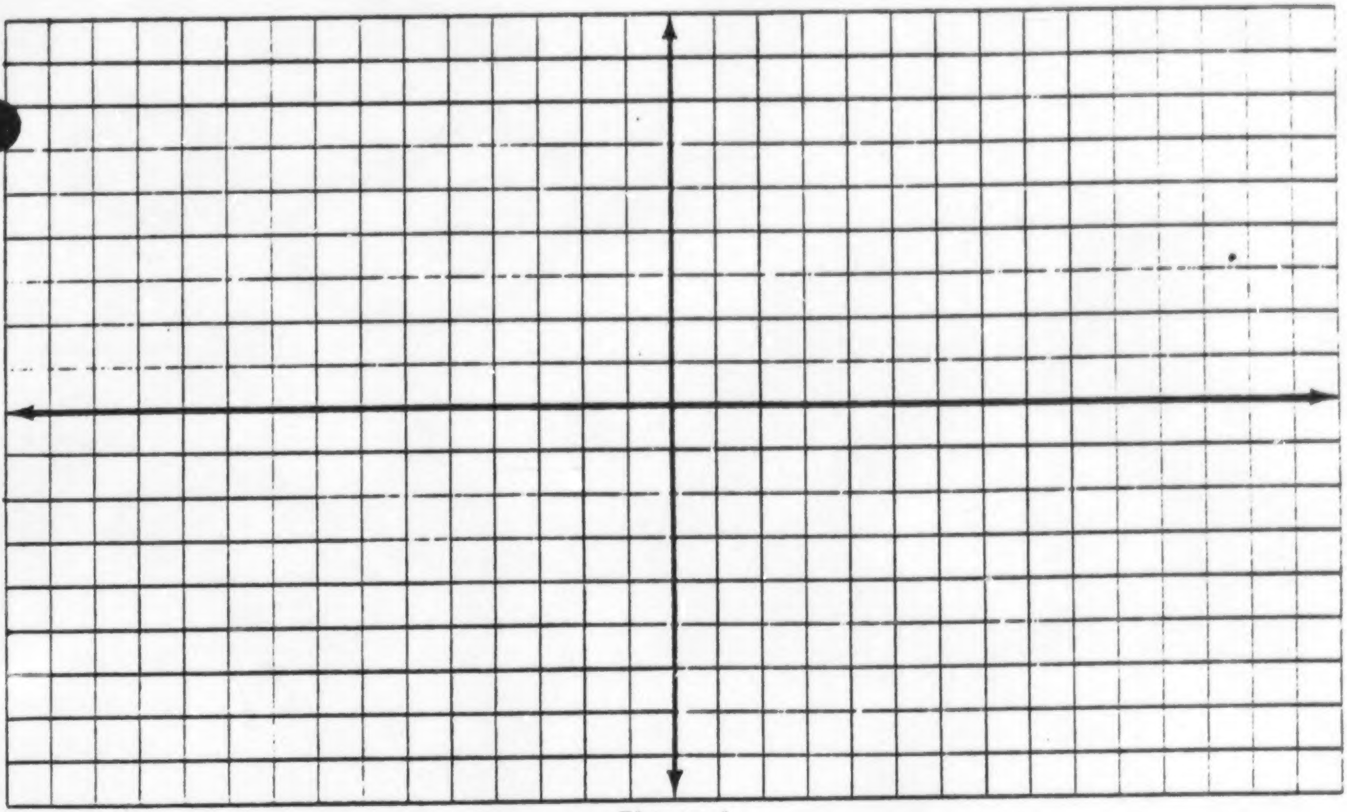


Figure A

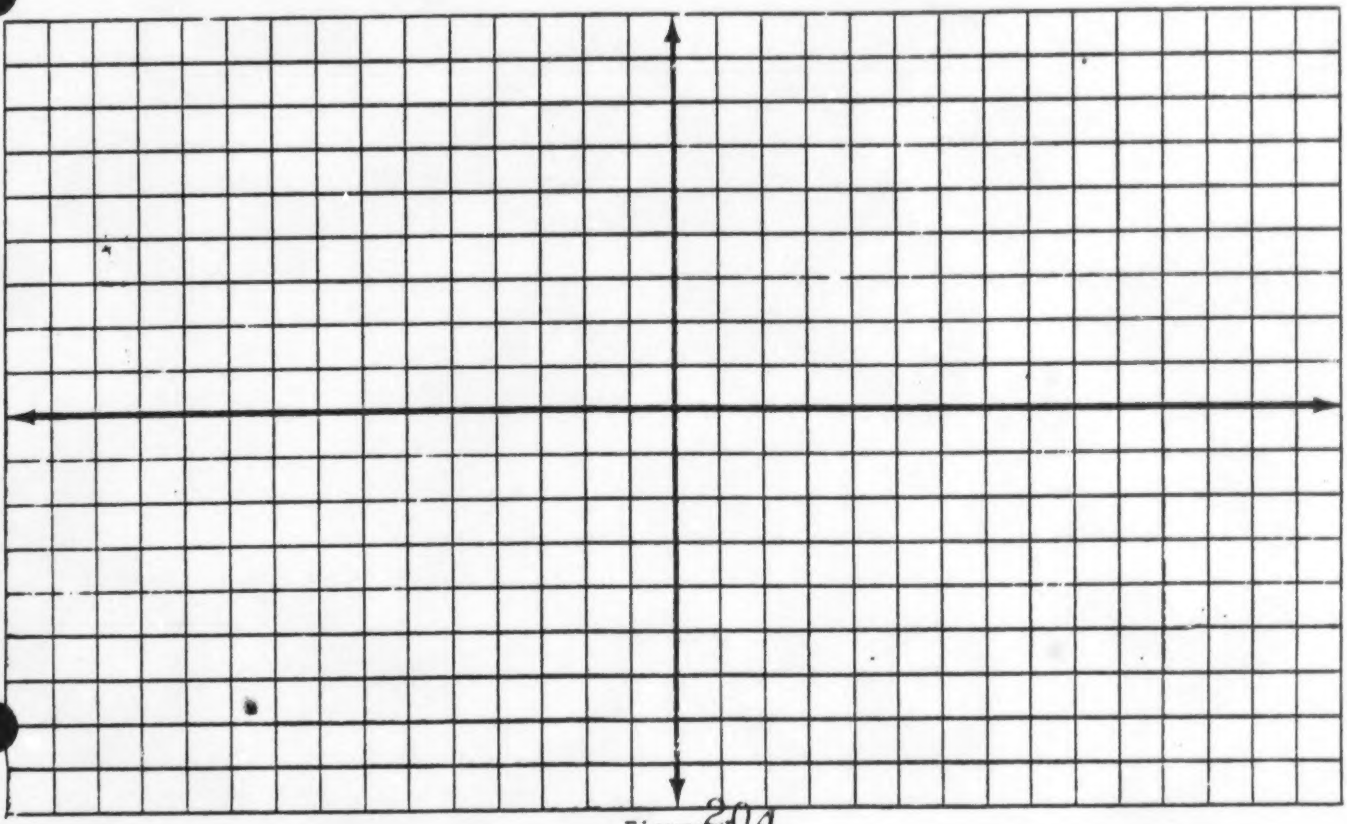


Figure B

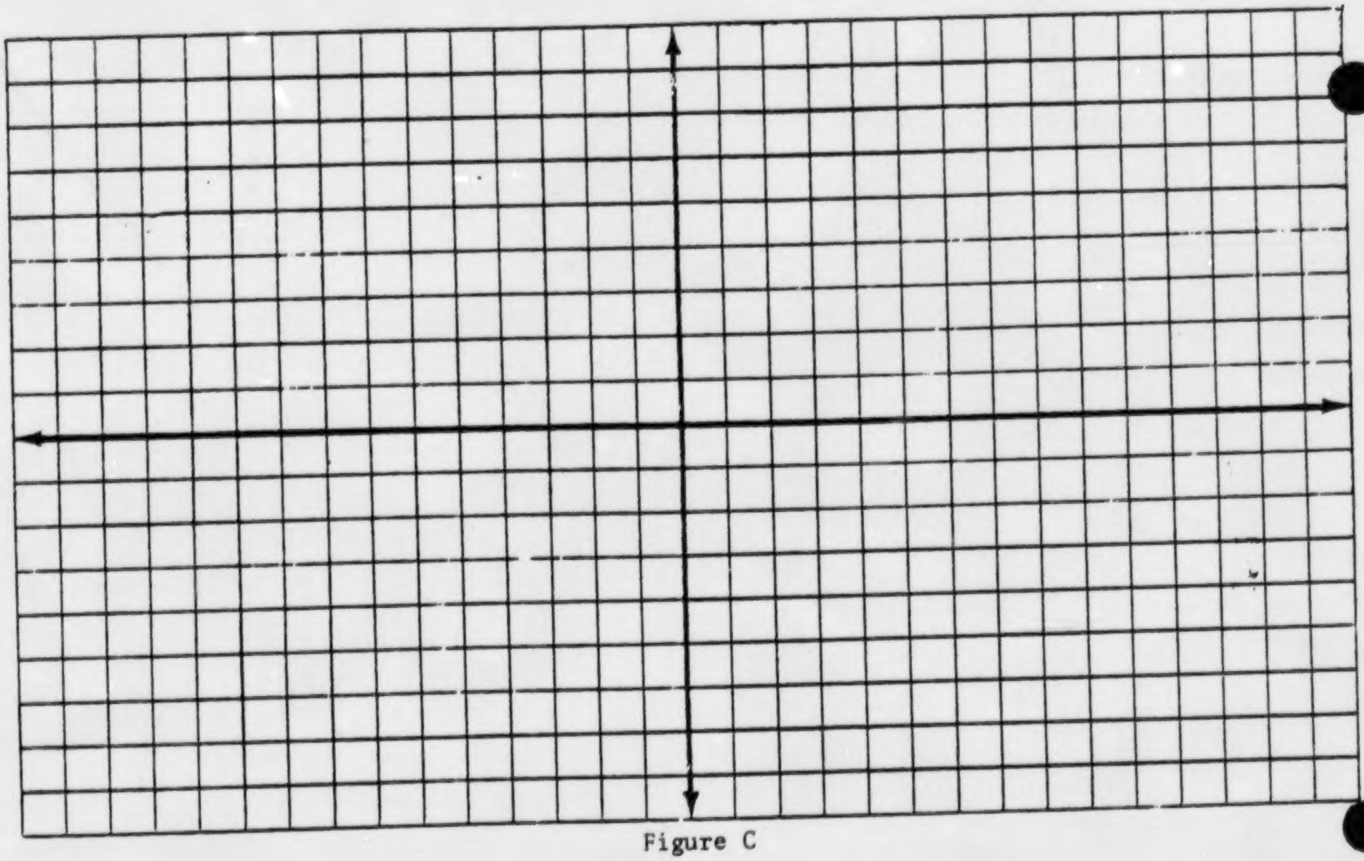


Figure C

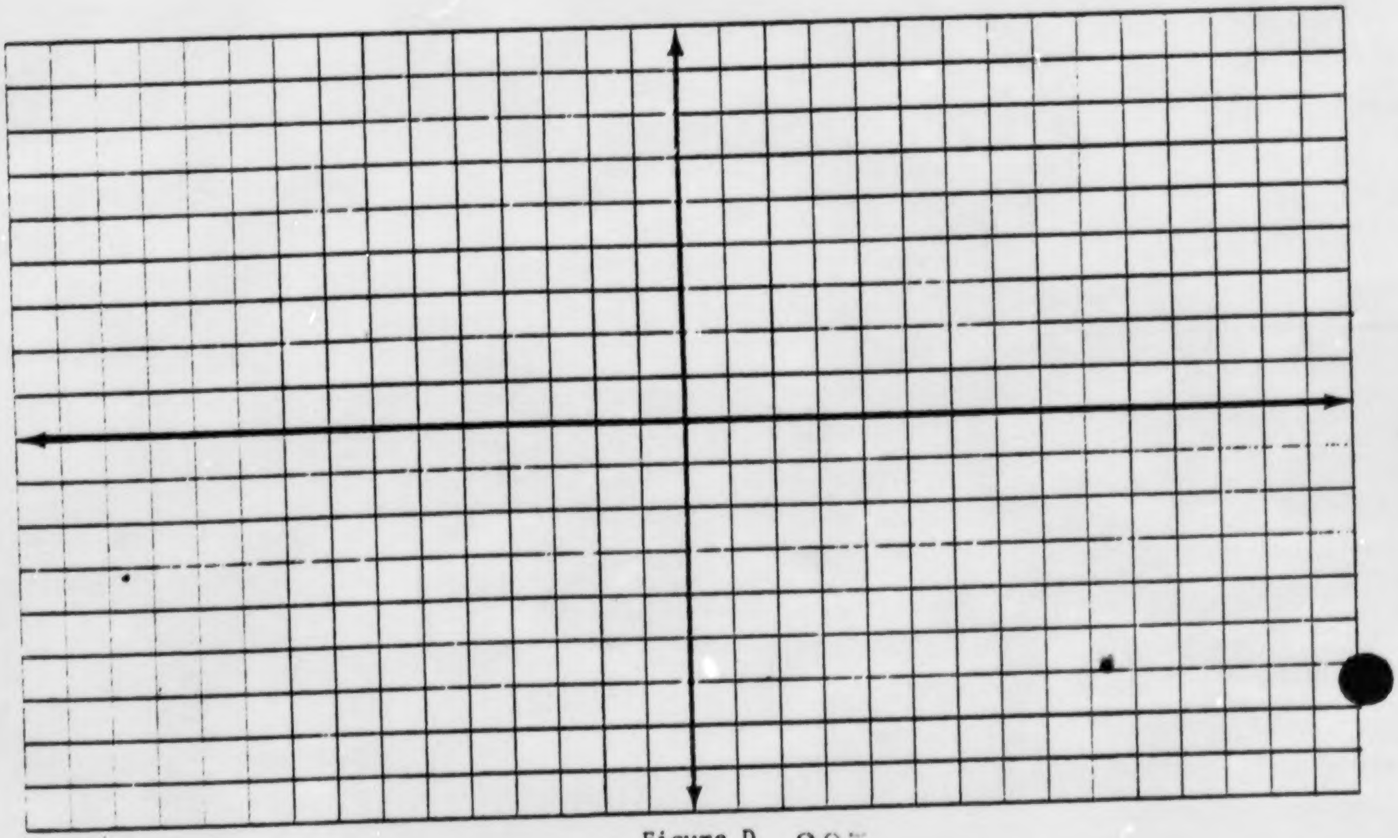


Figure D

ANSWER KEY

Chapter 16, Supplementary Worksheet 1

1. a.

x	0	1	2	3	4
y	3	4	5	6	7

b.

x	0	1	2	3	4
y	0	4	8	12	16

c.

x	0	1	2	3	4
y	3	5	7	9	11

d.

x	0	1	2	3	4
y	$^{-}2$	3	8	13	18

e.

x	0	1	2	3	4
y	0	1	4	9	16

f.

x	0	1	2	3	4
y	$^{-}3$	$^{-}2$	1	6	13

g.

x	0	1	2	3	4
y	0	1	8	27	64

2. a. 0 4 8 12 16 20 24 b. 5 14 23 32 41

c. 9 12 15 18 21 d. 40 47 54 61 68

3. Exercises 1a, 1c, and 1d.

4. a. 1 4 16 64 256 b. 3 24 192 1,536 12,288

c. 5 15 45 135 405 d. 7 14 28 56 112

Chapter 16, Quiz 1 *(10 points)*

(2) 1. a. Yes b. Yes

(4) 2. Answers will vary. Here are possible answers:

a. (0,$^{-}3$), (1,3), (2,9), (3,15) b. (0,0), (1,3), (2,12), (3,27)

(2) 3. a. 25 b. $^{-}11$

(2) 4. a. 2 6 18 54 162 b. 12 18 24 30 36

Chapter 16, Quiz 2 *(10 points)*

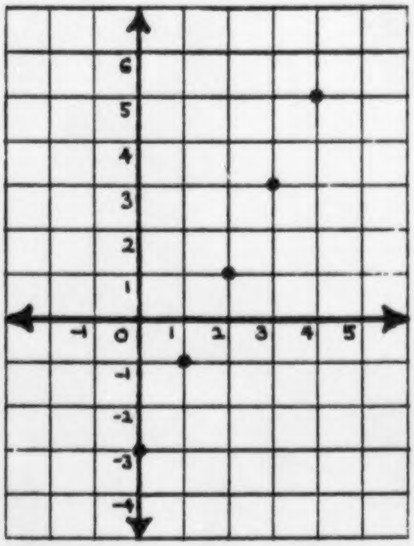
(4) 1. a. (1) domain: {6, $^{-}3$, 2, 7} (2) range: {4, 5, 1, $^{-}3$}

b. (1) domain: set of real numbers (2) set of real numbers

(Go on to the next page.)

Chapter 16 Answer Key - Page 2

(4) 2. a.



b. the line through points shown on figure A

(2) 3. a. $c(x) = 0.15x$

b. $w(c) = 10 + 0.8c$

Chapter 16 Test *(50 points)*

(8) 1. Answers will vary. Here are some possible answers:

a. $(0, {}^{-}3), (1, 2), (2, 7), (3, 12)$

b. $(1, 24), (2, 12), (3, 8), (4, 6)$

(6) 2. a. domain: $\{2, 5, 6, 1\}$

range: $\{{}^{-}8, 7, 10, 4\}$

b. domain: set of integers

range: set of integers

c. domain: $\{1, 4, 2, 0\}$

range: $\{5, 3, 8, 9\}$

(3) 3. a. 3 b. 15 c. $^{-}11$

(4) d. See the graph on the next page. *(1)* e. linear function

(6) 4. a. Yes b. No c. Yes

(Go on to the next page.)

(6) 5. a. 1 5 25 125 625

b. 3 9 15 21 27 33

c. 20 28 36 44 52

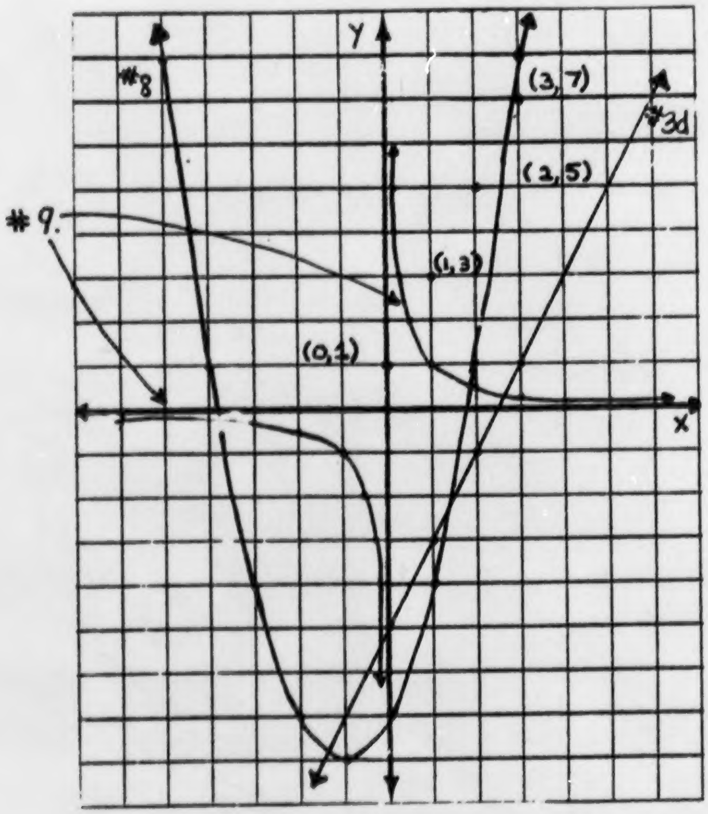
(4) 6. Points: (0, 1), (1, 3), (2, 5), (3, 7). Points are graphed in the figure below.

(2) 7. Answers will vary. Here is an example:

{(2, 5), (2, 7), (3, 4), (6, $^-2$)}

(4) 8. See the parabola graphed in the figure below.

(4) 9. See the hyperbola graphed in the figure below.

(2) 10. The cost of oranges is 69¢ per pound.